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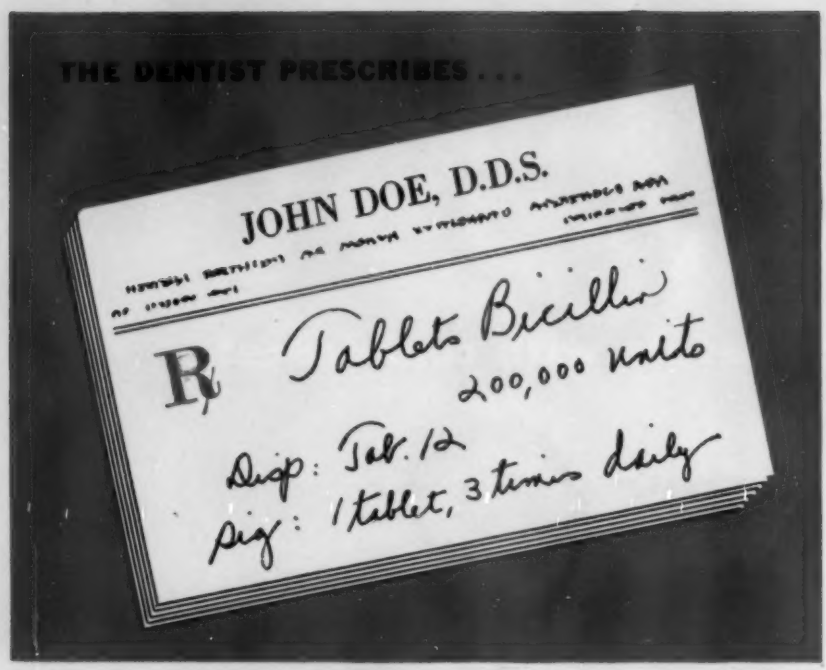

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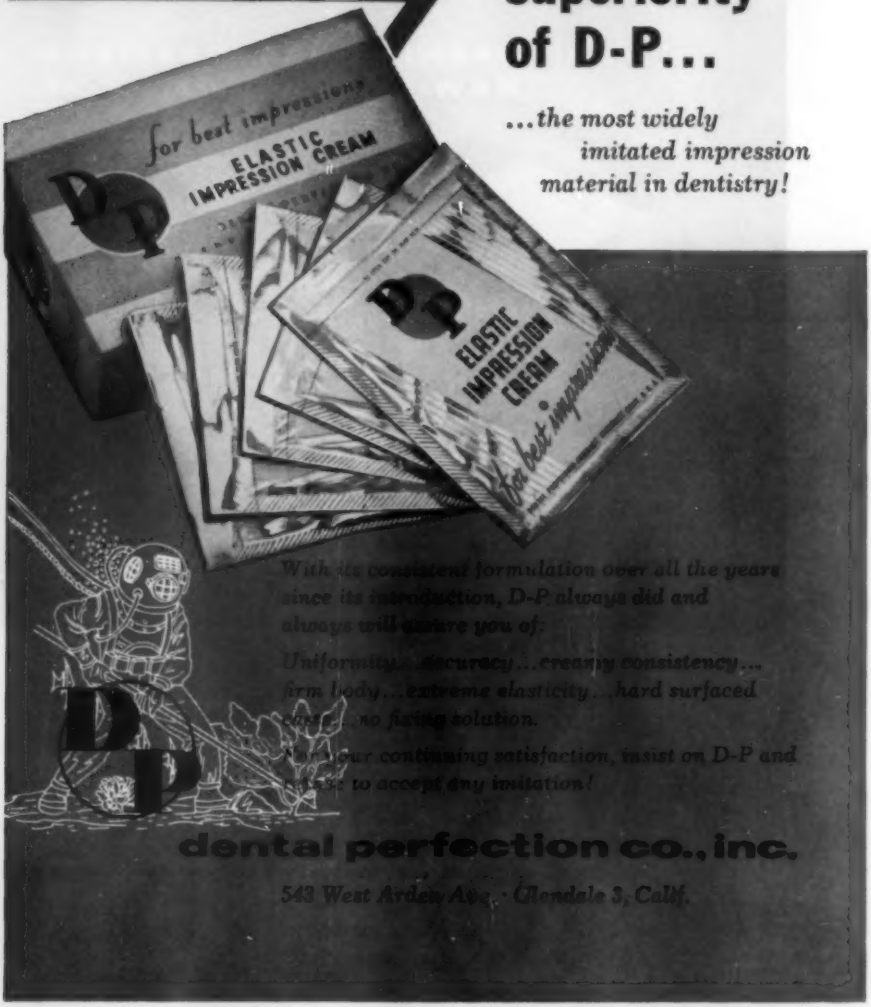
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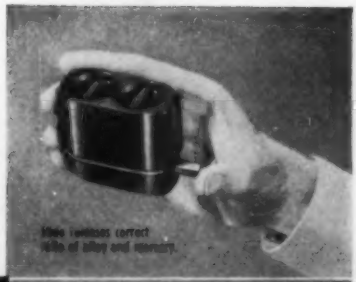

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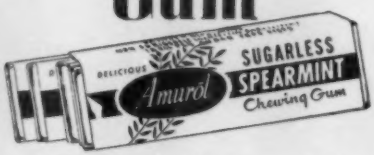

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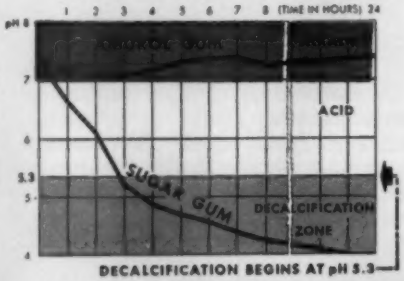

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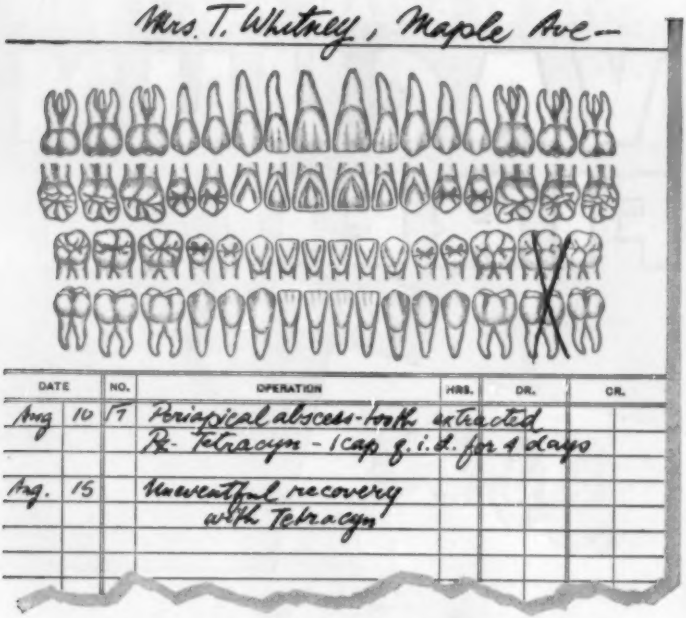

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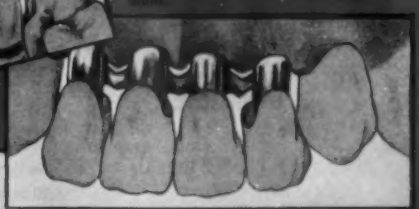

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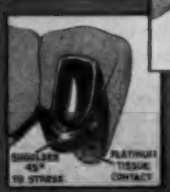

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Dental and facial pain: introduction

L. Laszlo Schwartz, D.D.S., New York

"Pain is the most individualizing thing on earth," writes Edith Hamilton in her *Great Age of Greek Literature*. "It is true," she continues, "that it is the great common bond as well, but that realization comes when it is over. To suffer is to be alone; to watch another suffer is to know the barrier that shuts each of us away by himself. Only individuals can suffer."

The truth of this observation can be appreciated particularly by dentists who as a profession face the problem of pain daily. In addition to their routine tasks, however, dentists are often called on to cope with problems of pain for which the cause is obscure and management difficult.

Pain for which the patient cannot find an explanation is especially alarming. Since he is almost as familiar with dental pain as he is with the pain of childhood cuts and bruises, the patient suffering from any painful symptoms of the jaws or face often goes first to see his dentist. The reason for this is not entirely based on his familiarity with dental pain.

Ambroise Paré, seventeenth century French surgeon, the father of surgery, described toothache as the most atrocious pain that can torment a man without being followed by death.[1] Thus, the patient seeks his dentist in the hope that his pain may prove to be dental. This knowledge provides him with reassurance and the expectation of prompt relief.

Dental pain, common though it is, presents problems in diagnosis and treatment which often tax the judgment and skill of the practitioner. In addition, if no dental

1. Oevres completes d'Ambroise Paré, accompagneés de notes historiques et critiques, par J. F. Melgaigne, Paris, 1840, vol. ii, p. 443.

cause is found, the dentist must be equipped with a knowledge of fields other than his own in order to make full use, through consultation, of the abilities of medical specialists. The fact that he is the first to see the patient places special responsibilities on him.

The symposium, herewith presented, on the diagnosis and control of dental and facial pain grew out of the combined efforts in research, teaching and practice of dentists and physicians at the Columbia-Presbyterian Medical Center. The symposium was presented on October 12, 1953, as one of nine concurrent symposia covering various aspects of dentistry, medicine, surgery and nursing held during the twenty-fifth anniversary celebration of the Medical Center.

It is hoped that publication will serve not only to emphasize the difficulties presented by the complexities of dental and facial pain, but also will point to the benefits which both dentists and physicians, and consequently patients, may derive through closer working relationships.

Pain associated with the temporomandibular joint

L. Laszlo Schwartz, D.D.S., New York

Temporomandibular joint pain is a symptom which is often alarming to the patient and perplexing to the practitioner. Many papers have been published, yet the cause of this symptom is still controversial and its treatment is varied and undependable.

Pain was but one of the symptoms included in the syndrome described by Costen which now bears his name.[1] This syndrome includes symptoms as varied as impaired hearing, vertigo, tinnitus, and temporomandibular joint pain. Costen maintained that this symptom complex was caused by the closing of the bite which permitted posterior displacement of the condyle. He held that pain arose as a result of irritation of the chorda tympani and pressure on or near the auriculotemporal nerve. Bite raising was the treatment recommended, and it was practiced extensively.

Different aspects of the syndrome have been questioned. In a recent evaluation, Zimmermann concludes that:

> It is evident that from an anatomic and functional point of view there is only one group of symptoms in Costen's syndrome of mandibular overclosure that has a basis of acceptable facts: trigeminal and occipital neuralgias. All other symptoms are highly questionable. The syndrome as such should be abandoned.[2]

During the past five years, the examination of over 500 patients in the Temporomandibular Joint Clinic, a research

Clinical professor of dentistry; head, division of clinical oral physiology, School of Dental and Oral Surgery, Faculty of Medicine, Columbia University; dental service, Presbyterian Hospital.

1. Costen, J. B. A syndrome of ear and sinus symptoms dependent upon disturbed function of the temporomandibular joint. Ann. Otol., Rhin. & Laryn. 43:1 March 1934.

2. Sarnat, B. G., editor. The temporomandibular joint. Springfield, Charles C Thomas, 1951, p. 107.

clinic of the Division of Clinical Oral Physiology of the dental school, Columbia University, disclosed that pain associated with the temporomandibular joint appeared to be different from the sudden, paroxysmal, and irregular pain of the neuralgias. Patients described their pain as dull and constant and aggravated by mandibular movements. Patients complained bitterly of the unrelenting nature of the pain. It was not always limited to the regions innervated by the fifth cranial nerve, but sometimes involved the neck and shoulder. The pain was almost invariably unilateral. In some patients the temporomandibular joint was tender to pressure, in others it was not. In many, the movements of the mandible were severely limited and painful; in others this symptom was minimal.

The search for the cause of the pain associated with the temporomandibular joint was facilitated by the cooperation of many departments of the Columbia-Presbyterian Medical Center—anesthesiology, medicine, otolaryngology, orthopedic surgery, neurology, neurological surgery, psychiatry, and radiology. The low incidence of organic disease of the temporomandibular joint found through this cooperative effort pointed to a functional disorder.

SOURCES OF PAIN

The experiments of Lewis and Kellgren[2] suggested that muscles may be responsible for the pain associated with the temporomandibular joint. Lewis found that pain induced in muscles by injecting isotonic acid solution or hypertonic saline solution was indistinguishable from that provoked by the same muscles working under ischemic conditions. The nature of the pain suggested a similarity to that described by our patients. Lewis[3] describes it as disagreeable, rather diffuse, and difficult to locate. It was continuous and wavered little in its intensity. Kellgren,[3] who continued the experiments of Lewis in his laboratory at the University College Hospital, London, reports that fascia and tendon sheath give sharply localized pain, while muscle gives diffuse pain which is referred. Muscle pain, he found, may be confused with pain arising from other structures such as the joints.

The investigations of Travell[4] also pointed to muscles as a source of pain. She described a group of disorders called myalgias, characterized by muscle spasm. These include sciatica, painful shoulder syndromes, tennis elbow and writer's cramp. In these conditions pain and limited motion are associated with what Travell describes as "trigger areas"—small areas in the myofascial structures hypersensitive to stretch and giving rise to muscle spasm with referred pain.

Examination of patients at the Temporomandibular Joint Clinic disclosed, in addition to joint tenderness, the presence of tender muscles. Not only the masseter, internal pterygoid, and temporalis muscles, but also the posterior cervical, trapezius, and sternomastoid muscles were frequently involved. The effectiveness of local anesthetics[5,6] followed by therapeutic exercises pointed to the fact that temporomandibular joint pain may often be due to a painful, self-perpetuating spasm of the masticatory muscles.

OBSERVATIONS

Since more than 90 per cent of the patients examined presented the symptom of painful mandibular movement, it was

3. Lewis, Sir Thomas. Pain. New York, Macmillan Co., 1946, p. 40.

4. Travell, J., and Rinzler, S. H.: Scientific exhibit: myofascial genesis of pain. Postgrad. Med. 11:425 May 1952.

5. Schwartz, L. Laszlo. Ethyl chloride treatment of painful limited mandibular movement. J.A.D.A. 48:497 May 1954.

6. Schwartz, L. Laszlo, and Tausig, D. P. Temporomandibular joint pain: treatment with intramuscular infiltration of tetracaine hydrochloride: a preliminary report. New York D. J. 20:219 May 1954.

felt that the group examined presented, as a whole, a pain-dysfunction syndrome —often tensional—similar to that found in skeletal muscles in other parts of the body. A careful study of case histories pointed to the possible relationship of seemingly unrelated symptoms—clicking, recurrent subluxation or dislocation, pain and limitation. The cessation of clicking, subluxation or dislocation following the sudden onset of a painful limitation of mandibular movement strongly suggested that the first symptoms were those representing an earlier stage of the second. Similarly, the disappearance, in time, of pain leaving only limitation suggested that the second was an earlier stage of the last. It was postulated that the temporomandibular joint pain-dysfunction syndrome was comprised of three phases:

1. The incoordination phase—characterized by incoordination of the mandibular muscles with symptoms such as clicking, recurrent subluxation or dislocation of the temporomandibular joint.

2. The pain-limitation phase—characterized by painful spasm of the masticatory and other antigravity muscles with the symptom of painful limited mandibular movements.

3. The limitation phase—characterized by contracture of the masticatory muscles with limited though painless mandibular movement. It is presumed that in this condition fibrotic changes have occurred in the muscles as a result of prolonged dysfunction.

An attempt was made to formulate a hypothesis which would explain temporomandibular joint pain and dysfunction. In some patients the relationship between cause and effect seemed clear. The wide, over-zealous bite or yawn, the long and arduous dental appointment, the difficult extraction—all pointed to mandibular overextension followed by muscle spasm and pain. Another factor, not nearly as evident, was subconscious oral activity, particularly in the form of clenching or grinding of teeth. Some patients were aware of these habits. In others suspicion was directed toward them by the fact that symptoms were often present on awakening. Psychiatric examinations described by Dr. Ruth E. Moulton in another article in this issue disclosed all of the group she examined to be highly tense individuals with noticeable oral habits.

RELATION OF MALOCCLUSION TO JOINT PAIN

The relation of malocclusion to temporomandibular joint pain and dysfunction has been emphasized in the dental literature. The impression left by the present study is that occlusal factors play but a contributing role. The factors associated with the onset of the temporomandibular joint syndrome have been formulated as follows:

1. Predisposing: constitutional (physiological); temperamental (psychological

2. Contributing: occlusal "abnormalities"

3. Precipitating: sudden or continuous stretch (yawn, wide bite, long dental or oral operations), sudden or extensive changes in proprioception (occlusal alteration through restoration or selective grinding)

4. Aggravating: alarming diagnoses or physiologically or psychologically traumatic treatment

It is believed these factors operate through a mechanism which, though basically tensional, is also self-perpetuating (see illustration), and that for effective treatment the following principles should be born in mind:

1. Stress should be lessened, if possible, through insight and understanding, explanation to the patient, sedation.

2. Pain and spasm should be relieved with ethyl chloride spray, intramuscular infiltration of procaine followed by reflex relaxation and passive stretch.

3. Muscle power, elasticity and coordination should be improved through therapeutic exercises.

4. Proprioception should be improved by judicious occlusal alteration.

FACTORS INVOLVED IN SUCCESSFUL THERAPY

Successful therapy also requires of the practitioner the mastery of technic. In temporomandibular joint syndromes, muscles are the main objects of treatment. Muscles can be gratifyingly responsive when coaxed or vexingly obdurate when forced. Hence a knowledge of the principles and practice of therapeutic exercises is essential. These have been clearly presented by Kraus.[7]

It goes without saying that before treatment is undertaken, careful and thorough diagnosis is essential—a careful history should be taken; clinical examination made including visualization, palpation and auscultation; consultations held; roentgenographic and electromyographic examinations made; a diagnostic impression gained; therapy given and results observed over a period of time, and finally a diagnostic conclusion reached. The following disorders must be ruled out:

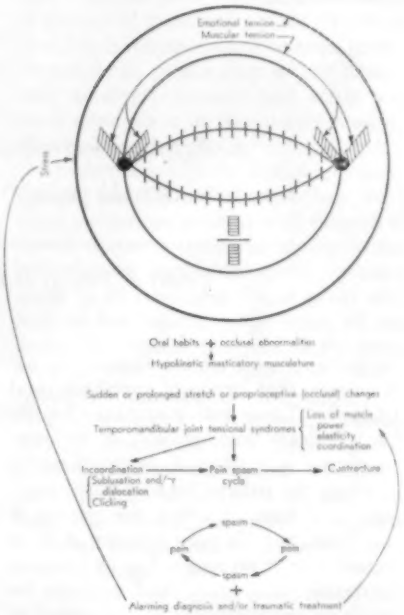
1. Dental and oral disease—intradental, periapical, and periodontal soft tissue lesions

2. Ear and paranasal sinus disease

3. Adenopathy (especially of the parotid gland)

4. Neurological disease—the neuralgias and diseases of the locomotor system

5. Collagenous disease — rheumatoid and osteoarthritis, scleroderma, and so forth.



Mechanism of temporomandibular joint tensional syndromes

6. Traumatic disorders—fractures and sprains

7. Neoplasms

The diagnosis and treatment of temporomandibular joint pain and dysfunction is a challenging undertaking requiring knowledge, skill and patience. Perhaps most important is an attitude which, by permitting the practitioner to "accept each new patient as a research problem," insures him against the "urge for spectacular action."[8]

7. Kraut, Hans. Principles and practice of therapeutic exercises. Springfield, Charles C Thomas, 1950.

8. Atchley, Dana. The healer and the scientist. In Saturday Review No. 3. New York, Bantam Books, 1954 p. 14, 6.

Application of anesthetic and analgesic agents to dental pain

Daniel P. Tausig, M.D., New York

Certain problems are involved in the use of agents that produce anesthesia and analgesia. These two terms may be defined quickly and grossly as follows: anesthesia is a state of unconsciousness in which the patient feels no pain; analgesia is a state in which the patient is conscious, but his pain perception is so altered that it no longer has its noxious, distressing component, and memory for events or sensations during the period of the analgesia is lost. Surgical anesthesia or analgesia ordinarily can be accomplished with the same agents. All the anesthetic agents or drugs that produce these two states are depressors which interfere with central nervous system function in some manner to produce the desired effect. In addition to useful central nervous system depression, all of these drugs have other depressant actions that can cause danger to the patient. Some have, in addition to dangerous depressant actions, irritating actions that cause overactivity of harmful reflexes.

HAZARDS IN ANESTHESIA

The greatest danger that accompanies anesthesia is lack of oxygen. Human beings can go for days without water and for weeks without food, but the time that the human body can survive, undamaged, without oxygen is measured in minutes. Several factors can lead to this dangerous and sometimes fatal lack of oxygen during anesthesia. Probably the most obvious is the administration of a mixture of gases for the patient to breathe which contains insufficient oxygen to support life. Even with an atmosphere that contains adequate oxygen, however, oxygen lack may still occur for other reasons. The anesthetic agent itself, or medication used in connection with anesthesia, may so depress the patient's respiratory effort that ventilation is insufficient to oxygenate the blood. Or, because of the depressant action of the anesthetic agent on circulation, an insufficient amount of oxygen is carried to the tissue to maintain life. A frequent cause of oxygen lack during anesthesia is obstruction to respiration. This may arise from mechanical difficulty in the equipment, from anatomic difficulties in the nose, pharynx, larynx or in the tracheobronchial tree. Obstruction may be caused by foreign bodies, blood, pus, other fluids or vomited stomach contents, or it may be caused by altered physiological responses such as closing of the vocal cords (laryngospasm) or constriction of the finer air passages in the lung (bronchospasm). When obstruction to respiration occurs, along with

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lack of oxygen, there is another insult to the tissues and that is retention of toxic amounts of carbon dioxide.

The combination of oxygen lack (anoxia) and carbon dioxide excess (hypercapnia) is known as asphyxia. The effect of asphyxia that is most feared, of course, is death. Usually, when cardiac arrest occurs during anesthesia and surgery, it can be shown that some time prior to the arrest there was a period of oxygen lack. Anoxia of the heart muscle sets the stage for fatal arrhythmias or fatal asystole. If a patient survives a brief period of asphyxia without a fatality, there may be later sequelae due to nonsurvival of various tissues. The heart may be so damaged that it slowly fails, there may be failure of kidney or liver function, or the brain may show signs of damage. The mildest form of postanoxia brain damage manifests itself as minor changes in personality. The severest form is the one in which the patient fails to regain consciousness and remains alive as a vegetable with no mental activity.

DANGERS FROM ANESTHESIA GIVEN IN DENTAL OFFICE

It is extremely unfortunate that in dentistry many factors operate to make general anesthesia dangerous. Frequently, for economic reasons, the patient has to have one person act as surgeon and anesthetist. With most of the anesthetic agents, and in many patients who are not in good health, deleterious changes in physiology can occur, not only from minute to minute, but literally from second to second. Divided attention may cause the operator to overlook the brief period of momentary warning signs before irreversible damage occurs.

It is difficult to obtain good medical evaluation of the dental patient as an anesthetic risk. The average practitioner of medicine who sees patients in his office does not see them from the same point of view as the trained anesthesiologist, and frequently overlooks, or is not aware of, factors of great importance. In dental practice, it is cumbersome to have proper preanesthesia preparation of the patient such as empty stomach and colon and medication given at the correct time interval before anesthesia.

Another hazard is the upright, or semiupright, position in the dental chair. With older patients or patients with diseases of the circulatory system who are under the influence of anesthetic agents, extreme drops in blood pressure may occur that lead to inadequate oxygenation of the brain, the respiratory center or the heart muscle. The greatest potential danger probably arises from the fact that dental surgery is done in the patient's airway. Dental procedures not only involve manipulations of the tongue, which can cause mechanical obstruction, but they may allow blood, secretions, irrigating fluids or foreign bodies to be aspirated into the lungs.

The explosion hazard is something that is present in many dental offices. In addition to the inevitable electrical equipment that creates sparks which can ignite flammable vapors, and the frequently used Bunsen burner, there is always present material on which static electricity can accumulate. This static electricity causes sparks of high voltage. Even if the dentist were to equip his office with a conductive type of flooring and to use conductive material on his chair, the patient's clothing and shoes would still present a hazard. From the medico-legal aspect alone, given these conditions, it would seem best to abandon the use of any anesthetic agent that is flammable.

This would leave the dentist with very little to use for general anesthesia in the dental office, as most of the frequently used agents in operating room anesthesia are highly flammable.

Two excellent gaseous agents are ethylene and cyclopropane; both are highly flammable, and when mixed with oxygen are explosive. Several of the vola-

tile liquids are flammable in air and are explosive when mixed with oxygen or nitrous oxide; these are ethyl ether, vinyl ether and ethyl chloride. All of these flammable agents are excellent drugs with certain advantages and disadvantages for various types of patients and in various situations.

The nonflammable anesthetic agents commonly available are nitrous oxide (a gas) and chloroform and trichloroethylene (both volatile liquids). Nitrous oxide, were it more potent, would be an ideal anesthetic agent. It is nonflammable, nonirritating and has no unpleasant odor. It is difficult to demonstrate any major physiological change in a patient who is receiving nitrous oxide with adequate amounts of oxygen, other than alteration in pain perception and loss of consciousness.

The great disadvantage of nitrous oxide is in its relative lack of potency. In the average patient, the inhalation of 80 per cent nitrous oxide with 20 per cent oxygen may or may not cause anesthesia, and if the patient is anesthetized by this mixture, which represents the minimum oxygen concentration for safety, the anesthesia will be very light. There are some patients who cannot be anesthetized with even 90 per cent nitrous oxide and only 10 per cent oxygen. Too often anesthesia is obtained with high concentrations of nitrous oxide and very low concentrations of oxygen. In these instances, the toxic effect of oxygen lack is added to the weak anesthetic power of nitrous oxide to put the patient to sleep. The literature devoted to the untoward effects of nitrous oxide anesthesia actually describes damage caused by anoxia.

Chloroform is a very potent sweet smelling volatile liquid and is an excellent anesthesia in the hands of those who have had vast experience in its use. It produces analgesia in a concentration of possibly less than one tenth of 1 per cent. The concentration required for maintenance of surgical anesthesia is about 2.5 per cent while the concentration that produces death is about 4 per cent. The difference between 2.5 per cent and 4 per cent does not leave a very wide margin of safety. Chloroform causes depression of the heart muscle, and when given to patients who are allowed to become anoxic may cause severe liver damage.

There is another halogenated compound, trichloroethylene, which has been used as an analgesic. It has been used, and successfully, as a supplement to nitrous oxide and oxygen mixtures. When small amounts are added to 60:40 or 65:35 mixtures of nitrous oxide and oxygen, light surgical anesthesia can be achieved without depriving the patient of oxygen. Trichloroethylene, like chloroform to which it is related, causes cardiac arrhythmias. It may cause ventricular irritability, and in deeper levels of anesthesia it may set the stage for fatal cardiac accidents. It certainly is not an agent to be used carelessly or without close supervision.

HAZARDS OF BARBITURATES

The intravenously administered fast-acting barbiturates are always mentioned in any discussion of anesthesia, although by strict definition these compounds do not act as true anesthetic agents. They are hypnotics or sleep-producing drugs.

The primary function of an anesthetic agent is to obtund pain. With the barbiturates, the alteration of pain perception that leads to the analgesic state is not produced. Drowsiness is produced, and in sufficient overdose the patient will lie still enough to be operated on and will not remember the procedure. This is not anesthesia, however, such as is achieved with ether or cyclopropane.

This class of drug offers great temptation to the man interested in accomplishing short surgical procedures, as inserting a needle in a vein is easy, the equipment is simple, and nothing goes over the patient's face. There are, unfortunately,

side effects that are very dangerous. Depression of respiration may occur before consciousness is lost, so that the patient presents the weird picture of being awake, but of turning cyanotic and not breathing unless told to inhale. Then again, circulation may be severely depressed by a dose still too small to put the patient to sleep. In a dental chair, with the patient in the upright position for surgery in the mouth, this circulatory and respiratory depression may lead to fatality. Also, patients given barbiturates are prone to develop laryngospasm, which, if not treated properly, may be fatal.

DISCUSSION

The present discussion shows an over-all picture of general anesthesia in the dental office that looks pretty grim. It comes down to the question of what can be done for a patient in whom local anesthesia cannot be used. The safest solution is hospitalization and anesthesia by a qualified anesthesiologist in the operating room; however, this is seldom practical.

Analgesia, by inhalation, offers a safe way out of the dilemma. Even small children learn how to breathe from a nasal inhaler while keeping their mouths open. In fact, these children find it rather amusing to get a jag from 20 per cent nitrous oxide and are perfectly willing to have cavities prepared while analgesic, but still conscious and cooperative. These patients have not lost their protective mechanisms of swallowing, expectorating and breathing. They do not have the accentuated harmful reflexes which lead to closure of the larynx or cardiac difficulties. They can maintain their position in the chair, and they get into difficulty only if the concentration is inadvertently raised to the point of producing the delirium of the second stage of anesthesia. If care is taken to prevent the patient from entering the stage of excitement, many emotionally stable patients can be handled easily, and, if analgesia by inhalation is combined with local block, painful procedures can be successfully completed.

Local block combined with analgesia and amnesia produced with intravenous thiopental sodium is technically more difficult to achieve, as the administration of thiopental sodium must be almost continuous and in minute amounts, and a constant check must be kept on the level of analgesia. The easiest way to check this level is to engage the patient in conversation, a maneuver not suited to dental work.

SUMMARY

All anesthetic agents are protoplasmic poisons. They cause depressions of all functional systems of the body, sometimes depressing respiration or circulation to a degree dangerous to the life of the patient. The special circumstances of dental surgery make it difficult to protect the patient from these harmful effects of anesthesia. Analgesia with low concentrations of nitrous oxide and high concentrations of oxygen offers a safe way to perform dental surgery on suitable patients.

Under a Crown • A crowned tooth is not a "crown of glory" and may cover a multitude of germs. *C. H. Mayo, "Problems of Infection," Minnesota Medicine 1:414, 1918.*

Control of pain in operative dentistry

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The causes of pain of greatest concern to the operative dentist are those associated with the reaction of the dental pulp and supporting tissues of the teeth on which he may be operating.

Dental pulp reacts to several stimuli. One of these is thermal shock due to loss of enamel—the normal protective covering—through caries, erosion, abrasion, receded gingiva or exposure of dentin and cementum at the neck of the tooth. Other causes might be the placing of metallic restorations in too close proximity to the pulp without the use of a nonconductive intermediate such as cavity lining or a cement base.[1]

The expansion of amalgam caused by improper handling can produce pain by pressure on dental tubuli. Heat resulting from the friction of a carelessly used bur, disk or stone in grinding and polishing also may cause pain. As a result of the carelessness, undue thermal changes are transmitted to the pulp, leading to exaggerated response, irritation and vascular congestion known as active or arterial hyperemia.[1]

Another stimulus may be a chemical irritant. Irritation and stimulation to dental fibrils from septic dentin left under restorations, leaky restorations that permit the entrance of saliva or bacteria, imperfect drying and exclusion of saliva from the field of operation through nonuse of the rubber dam, septic cement under crowns and leaky restorations, and the presence of food masses in open cavities are all conditions that may cause infection of pulp tissue without exposure.[1]

Sugar, acids, or any salts, when applied to dentin, may cause a reaction in the pulp, just as the continued contact of saliva on exposed surfaces such as the neck of a tooth or improperly sealed cavities may cause pain.[1]

Caustic and irritating drugs—zinc chloride, trichloroacetic acid, formaldehyde solutions and silver nitrate—may be used in too close proximity to the pulp and may act as chemical irritants. The liquids of zinc phosphate and silicate cements are acid in reaction and can cause damage. Certain agents used in pulp capping can be extremely irritating. Sodium fluoride used in topical applications also can be painful.

A third stimulus which might be considered a traumatic injury is food impaction that results in periodontal lesions. Hirschfeld[2] lists 20 ill effects from food impaction.

Careless cutting or grinding, blows on teeth, fractures of enamel and splitting away exposed dentin, thread biting, ice cracking, overmalleting of gold or amalgam, forceable seating of tight fitting

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1. McGehee, W. H. O. Textbook of operative dentistry, ed. 2. Philadelphia, Blakiston Co., 1936.

2. Hirschfeld, Isador. The toothbrush; its use and abuse. New York, Dental Items of Interest Publishing Co., 1939, p. 510.

inlays, excessive occlusion of restorations and traumatic occlusion from whatever cause may act directly on pulp or may act first on the periodontal membrane and then produce hyperemia of the pulp.

A fourth stimulus is electric phenomena or galvanosis. Touching a large metallic restoration with an instrument may produce a sharp pain in the pulp because of a difference in electric potential.[1] Careless use of electric pulp testing machines may deliver too heavy a voltage and cause pain.

Other stimuli include the extension of vascular disturbances from other parts, such, for example, as an adjacent tooth with an alveolar abscess, a periodontal pocket, or a socket that is inflamed or infected after an extraction.[1]

The causes sometimes may be systemic. The pulp is an end circulatory organ and may suffer congestion. Conditions such as a common cold, malaria, influenza, mercurial and other systemic poisons may manifest themselves in the oral cavity with the production of periodontal disturbances and subsequent pulp involvement.[1]

Anemia, febrile diseases and general systemic debility may lower the vital activity and resistive powers of the pulp and render it more subject to injury.[1]

Pain may be caused by atmospheric changes of severe or sudden nature—for example, in an airplane flight at heights over 7,000 feet when there is a sudden decrease in pressure. Pressurized cabins now obviate this cause of pain among civilians.

With the majority of causes of pain associated with operative dentistry known, the problem of its control is easier. Psychic factors are just as important as physical factors, however, and must be considered as well. Apprehension and fear of pain can be real to the patient who is not properly conditioned prior to dental treatment. Vivid memories of previous treatment that had involved severe physical pain or unpleasant tensions may make him apprehensive of another visit to the dentist's office. Because of this, it is imperative that the dentist strive to build up the patient's confidence so that the practitioner may prescribe and perform the work necessary for the patient's dental health.

The dentist who hopes to serve his patients well must cultivate those attributes which foster confidence in his ability to do what is necessary in the most efficient and comfortable manner. The dentist, therefore, must consider psychology, anesthesia, equipment, drugs, method of operative procedure and proper instruments if he is to achieve the minimum of discomfort and the maximum of health service. Consideration of all the details of patient management is necessary if pain is to be reduced to a minimum. Fear of pain, actual pain and unpleasant sensation are all very real to the patient.

ESTABLISHMENT OF FAVORABLE ENVIRONMENT

The objective phase of the establishment of a favorable environment is concerned with the equipment, cleanliness, good taste in decoration, and the general impression of a cheerful atmosphere—simplicity rather than garishness, harmonizing colors on the walls, pictures which provoke pleasant thoughts, soft lighting and an intelligent choice of furnishings—all of the factors which are conducive to a feeling of relaxation.

Pleasant office surroundings and the attitude of the dentist and his nurse go a long way toward enlisting the patient's confidence. A sympathetic approach and consideration of the patient's complaints will help allay his latent or active fears. Naturally, some practitioners have more of this ability than others. Those who have less should cultivate these traits so that they may overcome unfavorable subjective impressions.

All known methods should be employed for the control of physical pain—

that pain which is incidental to the performance of the work at hand. Much needless pain is caused by errors or lack of skill in operating.

PRODUCTION OF PAIN AND ITS AVOIDANCE

Two of the factors that produce pain in operating on human teeth are cutting through and entering sensitive regions and thermal change.

The most sensitive regions according to histologists are (1) the pulp, (2) the dentinoenamel junction, (3) the granular layer of Tomes, and (4) the interglobular dentin. A profound knowledge of tooth structures will help to eliminate needless pain in living pulps caused by cutting operations.

According to Bodecker,[3] the dentinal tubules are channels in the dentin conveying the protoplasm fibrils of the odontoblasts to the pulp, and the dentinoenamel junction is a region of great sensitivity. That is because the fibrils split and branch and thus provide the region with innumerable sense organs. When an instrument strikes this region, pain results. In cavity preparation, the dentin has to be cut through.

Bodecker[3] and others have recommended that the dentinoenamel junction be undermined to the desired depth with a small inverted cone bur, thus cutting off the pathway of communication to the pulp; thereby, further cutting will be much less painful. This undermined tooth substance can be removed with burs, hatchets or chisels with a minimum of pain and the cavity given its finished form.

The rapid cutting of tooth structure with rotary instruments gives rise to frictional heat. The heat causes expansion of the contents of the pulp chamber and pain results. If heat is not controlled, the end result may be a pulp that is damaged beyond recovery. Henschel,[4] Jeserich,[5] and others have pointed out the harm resulting from a rapid temperature elevation in the preparation of teeth for restorations. As a result, most dentists use a device connected to the spray bottle which directs a stream of water on the bur or stone used in cutting. This is an effective means of reducing and preventing pulp trauma.

The introduction of rapidly mixed cement will generate heat and cause pain for the patient when bridges, inlays, crowns and so on are setting. The trying-in of metal restorations can cause pain if there is a great differential in temperature; it is an easy matter to correct this error. Medications used in the cavity can be brought to mouth temperature before application to the cut tubuli, thus helping to avoid pain. Baseplate gutta percha used for temporary fillings can be too hot and cause pain. It should be allowed to cool sufficiently or be dipped in eucalyptol or other solvent to bring it to a comfortable temperature.

Another frequent source of pain to the patient is the clumsiness of the dentist in the use of his hands. "Heavy hands" is no imaginary cause of pain. Forcing ligatures between contact points, thus allowing them to traumatize the papilla, or tying ligatures around the gingival periphery of young teeth, is extremely painful and causes much harm. The pressure of fingers on lips in operating, or the drawing back of the cheek to allow better access and visibility can be painful and should be avoided. The dentist should use extreme care in placing clamps or separators and in fitting bands to avoid trauma and pain. Scaling of teeth in periodontal treatment is another procedure in which extreme care must be used to avoid trauma and pain. Drying

3. Bodecker, C. F. Fundamentals of dental histology and embryology. New York, Columbia University Press, 1940.

4. Henschel, C. J. Friction of revolving steel burs. J.A.D.A. 31:895 July 1, 1944.

5. Jeserich, P. H. Factors necessary to minimize thermal changes in tooth structure from operative procedures. New York J. D. 5:275 Dec. 1935.

of the tissues and application of a topical anesthetic may be sufficient to overcome some of this discomfort.

Pain and fear of pain are great deterrents to the effective accomplishment of operative dentistry. The patient associates practically everything done with pain or an unpleasant experience. It is little wonder that patients defer dental treatment. Fear of pain can be, and often is, as real as pain itself. For such patients, premedication is effective and will place the individual in a cooperative state of mind so that further therapy can be continued without creating tenseness, nervousness or anxiety.

Comedication[6] also helps to relax the patient and make him more cooperative. There is some danger in the use of premedication or comedication in that the hypnotic effect of the drug may result in a condition of stupor and delayed reaction to stimuli. Someone always should accompany patients who have had or are to have such therapy.

The injection anesthetics are a great boon to the operative dentist. If used judiciously, they help the dentist to perform all necessary operations on human teeth with a minimum of pain. Even the original puncture of the needle can be painless if the area of injection is properly prepared. The short induction time and the prolonged period of anesthesia permit the dentist to make the most effective use of his operating time.

Analgesia is employed by some dentists in an effort to control pain incidental to operative procedures. The standard method of administering analgesia using nitrous oxide is well known to all dentists. Analgesia is not popular for use in operative dentistry, however, because of the fact that the apparatus itself may impede the work to some extent, and it cannot be used with facility in all operations.

Substitutes for rotary instruments may be used to reduce pain. They operate on the principle of reducing tooth structure by other means. Such an apparatus is the Airdent with which a stream of carbon dioxide carrying aluminum oxide in suspension is directed at the area on the tooth to be cut. It cuts tooth structure rapidly and without pain in about 50 per cent of the operations; however, the preparation must be finished with conventional type instruments.

A bur cooling device known as the Waropa was introduced a few years ago and met with some success. Refrigeration of the parts being operated on has been tried and was fairly successful in reducing pain.

COMMENT

The responsibility of the dentist in operative procedures is to use every means at his command to reduce pain and unpleasant sensations so that fear of the dentist may be gradually reduced. The control of pain in operative dentistry does not necessarily mean its total elimination. It does mean that pain may be controlled to a point where the dentist can perform the operation successfully and at the same time leave as few unfavorable impressions in the minds of the patients as possible.

6. Sherman, Harold, and Oman, C. R. Combined anesthesia in operative dentistry. J.A.D.A. 42:294 March 1951.

Study • There is no business, no avocation whatever, which will not permit a man who has the inclination to give a little time every day to study. ***Daniel Wyttenbach.***

Trigeminal neuralgia

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Trigeminal neuralgia, or tic douloureux, presents one of the most constant and classic syndromes in all medicine.

This syndrome is characterized by three features: (1) intermittent paroxysms of pain along the distribution of one or more divisions of the trigeminal nerve, with complete freedom from the pain between the paroxysms; (2) a unique "trigger mechanism" by which is meant that stimulation to the skin of the face or to the membranes of the mouth such as washing, shaving, drinking hot or cold liquids, eating rough foods, talking, or even smiling, will set off paroxysms of pain; and (3) a neurological examination with no abnormal findings. This unique triad is always produced by true trigeminal neuralgia and never by any other condition.

The pain of trigeminal neuralgia must be differentiated from neuritic pain secondary to infections of teeth or nasal sinuses or to pressure on some part of the nerve by a tumor. These neuritic pains are always continuous, never paroxysmal, and are never aggravated but are often relieved by heat or cold or friction applied to the face. Pain due to pressure on the nerve by a tumor is invariably accompanied by objective neurologic signs on examination, such as loss of the corneal reflex, impairment of sensation of the skin and mucous membranes, wasting and weakness of the muscles of mastication.

The cause of trigeminal neuralgia remains a mystery. The most careful studies of neuralgic nerves have never revealed any structural basis for the pain.

Of special interest is the fact that, although the pain of trigeminal neuralgia frequently seems to arise from decayed or abscessed teeth, removal of these teeth and correction of the dental condition are never followed by relief in true trigeminal neuralgia. Vital teeth which can be salvaged should never be extracted in an effort to stop trigeminal neuralgia.

The course of untreated trigeminal neuralgia is remarkably constant. There may be temporary remissions, but pain always returns and always in more severe form and wider distribution than before. There is no spontaneous termination of the disease.

METHODS OF TREATMENT

There are three well-established methods for treating trigeminal neuralgia. The first is by the inhalation of trichloroethylene, a highly volatile liquid closely related to chloroform. This will give relief to 5 or 10 per cent of the patients.

The second standard method of treatment is by the injection of 95 per cent alcohol directly into those divisions of the nerve that are giving rise to pain. This procedure is extremely painful, and the relief afforded is only temporary. This relief lasts, as a rule, from 6 to 18

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months after the first injection, but successive injections are always more difficult to accomplish and give shorter periods of relief; eventually a time will come for each patient when alcohol will no longer relieve the pain.

The third method, and the one now generally accepted, is the intracranial section of the sensory root of the nerve. This can be done above the tentorium through the temporal approach or below the tentorium through the suboccipital approach. Both methods have good points, but at the Neurological Institute the simpler temporal approach has proved to be satisfactory and is the method generally used. This operation can be performed entirely under local anesthesia or with the help of one of the new intravenous barbiturates such as thiopental sodium. The mortality rate ofter operations is only a small fraction of 1 per cent despite the fact that many patients are 60 to 70 years of age or older and often are considerably debilitated. Also, the postoperative morbidity is slight, the patients being out of bed as a rule on the first or second postoperative day and out of the hospital by the end of five or six days.

The relief of pain after sectioning of the nerve is immediate, complete and permanent in all instances of true trigeminal neuralgia. The principal objection to the procedure is that the skin and mucous membrane supplied by the divided nerve fibers are permanently anesthetized after the operation, but the exchange of pain for anesthesia is, as a rule, easily accepted by patients who have been suffering with severe trigeminal neuralgia. It is only in instances where operations have been performed ill-advisedly for facial pain, which is not true trigeminal neuralgia, that this postoperative numbness of the face acquires importance. In such cases, the facial pain will not be relieved by the operation, and the numbness will simply add a new complaint to the original one.

If the neuralgia has involved the first, or ophthalmic, division of the nerve, necessitating sectioning of these fibers, the sectioning will result in permanent anesthesia of the upper eyelid, conjunctiva and cornea. Under these circumstances, if a foreign body gets into the eye, the patient will experience no pain, although the conjunctiva and cornea will become inflamed. This condition requires immediate removal of the foreign body and closure of the eyelid. Most neurosurgeons feel that a patch should not be applied to the eye with an anesthetized cornea because, should the eyelid open underneath the patch, the patient will not be aware of it, and the cotton or gauze will continue to rest directly on the cornea, thus producing serious corneal ulceration. They prefer to close this eyelid with a small collodion strip and have found that, by use of this simple expedient, inflammation of the conjunctiva and cornea will, in most instances, heal promptly.

Facial paralysis, which is often feared by the layman faced with an operation for relief of trigeminal neuralgia, is a rare complication. When it does develop, it is usually not until the second or third postoperative day and hence cannot be the result of direct trauma to the nerve during operation. The mechanism of this delayed palsy is not known. Fortunately, it is almost never permanent, spontaneous recovery usually taking place in a matter of weeks.

From time to time, new proposals for the medical treatment of trigeminal neuralgia have been made. None of these have stood the test of time. A recent one consists of the injection of high concentrations of vitamin B12 over a period of weeks. The claims made for this method of treatment have not been substantiated by the careful studies made at the Neurological Institute.

It has been claimed that an operation on the sphenopalatine ganglion will relieve certain types of facial pain, but I

have found no reports of authenticated cases where operation on this ganglion has relieved true trigeminal neuralgia.

During the past year or so, two new operative procedures have been proposed that are claimed to relieve trigeminal neuralgia without leaving the skin and mucous membranes anesthetized. These operations are designed to "decompress" the trigeminal nerve at some point along its course where it is thought to be constricted. In one operation, the opening in the tentorium through which the sensory root passes is enlarged. In the other, the foramens, rotundum and ovale, through which the second and third divisions of the nerve leave the skull, are enlarged. Although hoping that the claims made for these new operations will prove to be true, most neurosurgeons question their validity and feel that judgment must be reserved for the time being.

COMMENT

The clinical syndrome of trigeminal neuralgia is exact and unique. The older established method of surgical treatment, although not perfect, is in the main safe and satisfactory. Nothing new of proved merit in the form of treatment has appeared in recent times to replace the established method of surgical treatment.

Psychiatric considerations in maxillofacial pain

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This report is based on psychiatric interviews with 35 patients from among the group examined in the Temporomandibular Joint Clinic. Each patient was interviewed for approximately one hour. The psychiatric data and impressions were recorded and later discussed with the dentist to determine possible correlation between the two orientations with regard to causation and behavior in treatment. Suggestions for further handling were then worked out.

One group of 20 patients was seen by another psychiatrist, who then discussed them with me; I interviewed the second group of 15 patients myself. There were some differences between the two groups, partly because the concept of what to look for had changed somewhat with time, and partly because the second group was more difficult both from a dental and from a psychiatric standpoint. In general, however, the two groups were remarkably similar and therefore will be discussed together.

The Temporomandibular Joint Clinic at first made an attempt to refer a typical cross section of patients for psychiatric consultations. This failed as many patients could see no reason for psychiatric consultation and refused it. Since time was limited, the dentist usually found it necessary to send those who were most difficult to treat and whose condition

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most warranted psychiatric help. Therefore, this report is based on a higher percentage of the more recalcitrant patients; however, it serves to illustrate the types of complications that were encountered. Many of the patients who refused psychiatric consultation were at least as sick or sicker than those who accepted it. Their fear and suspicions would not permit them to face the thought of talking about themselves.

COMPLAINTS OF PATIENTS

The main dental complaint of 25 of the 35 patients was pain. In some, this pain was limited to the teeth or jaws. In others (more than one third) the radiations were more far reaching. In still others (10) the main complaint centered on the "bite"—feelings of restricted motion and difficulty in opening or chewing or a sensation of clicking, banging or other noise while chewing. The discomfort was described as chronic or vaguely intermittent over long periods of time, usually one to five years. One stated the discomfort had lasted 28 years. There was often a ready awareness that tension and emotional upheaval made the pain worse, and the need for relaxation and freedom from "aggravation" was almost universal.

The descriptions of pain were varied, diffuse, nonanatomic or even grossly bizarre, and there was no indication of a consistent neurological pattern such as might be found in a neuralgia, although in several instances a diagnosis of trigeminal neuralgia had at one time been advanced or suggested but had not been confirmed.

The pain tended to radiate into various areas of the head, neck, ears and even shoulders. Severe headaches and extreme tension in the neck muscles were frequent. The pain was given very irrational meanings by several patients, such as "it made me blind for hours," "I thought I would lose my hearing," and "I am sure there is a tearing of the blood vessels in my head with bleeding inside." The latter was a particularly outstanding example of a psychotic or prepsychotic boy who feared he was losing his mind and dramatized this fear by thinking that his head was falling apart. His physical symptoms had started seven years earlier, shortly after his mental illness had become apparent. He was being seen in a psychiatric clinic, but the dentists in the same hospital had not made use of the psychiatric material and had gone ahead taking his dental complaints at face value. They injected sclerosing solution into the temporomandibular joint in the hope of limiting the motion. Because of his mental illness, this only served to focus his attention even more on this area, with the result that he has been seeking desperately for dental help throughout the seven years since then. This example illustrates the necessity for evaluating the total hospital experience, including psychiatric data, of any patient before determining treatment procedures that are elective or open to question.

Few of the patients were that mentally ill, but many of them had anxiety symptoms such as dizziness, choking spells, insomnia, vomiting, phobias (fear of cancer in four cases) and various sensations of pressure in the head. Real depression of mood was noticeable in ten patients and four had thought of suicide. These states of mind were not inspired by the pain but related to desperate life situations that antedated the physical symptoms.

Five patients were convinced they had a deformity of their faces such as a crooked smile, altered expressions, or "not looking like myself." These fears were so unwarranted, yet so deeply rooted, that they might be called delusions. These patients could be diagnosed as borderline schizophrenics; however, they appeared sufficiently normal to be overlooked as mentally ill by the

busy practitioner. Anxiety and tension were apparent and readily observed in all but four patients. Miscellaneous psychosomatic symptoms other than those referrable to the head and neck included eight instances of gastric complaints. One patient's anxiety brought on diarrhea and another had a peptic ulcer which bothered him periodically and precipitated his dental complaints. There were five women who suffered from discomfort connected with the female genital tract such as excessive menopausal distress.

OBSERVATIONS

Observation of the entire group indicated that these patients were not only unusually anxious but also tended to express their anxieties with physical symptoms. The many factors that seemed to contribute to the dental situation could be divided into local dental factors and the general psychiatric factors. The dental factor which appeared most frequently was bruxism. This occurred in 18 of the 35 patients. Some were aware of clamping and grinding their teeth, especially when trying to repress anger. Others were told by their families that they ground their teeth in their sleep. Many awoke with stiff sore jaws and tender teeth and were unable to open their mouths. The tension usually subsided during the day. There would be periods of great emotional stress at which time they would be unable to open their mouths fully for days and even months.

In others, a much smaller group, the dental precipitating factor appeared to be more direct; namely, overextension in a yawn or preoccupation with the mobility of the joint. One young boy enjoyed demonstrating his clicking temporomandibular joint for the amusement of his companions. A hypochrondriacal woman constantly opened her mouth too wide in order to see if her throat was sore.

The second most frequent dental precipitating factor was trauma to the teeth. Of the 16 examples of this, six were extractions, which were unusually painful, extended or multiple. In four patients, the precipitating factor had been grinding to change the occlusion. Filling of teeth and the use of needles for local anesthesia to which the patient overreacted were the factors in three patients. One patient bit on buckshot, one had a severe accidental fall, and one had had a difficult bridge repair. In some instances, the situation seemed unduly traumatic because of questionable judgment on the part of a dentist; for example, working too many hours on a patient (in one instance, six hours), using no anesthesia for a particularly painful extraction, not preparing the patient for extraction but overwhelming him with it suddenly, extracting several teeth in rapid succession, or unnecessary grinding to "improve" an occlusion which appeared satisfactory to the patient. This latter might not upset the ordinary patient but is enough to precipitate tremendous preoccupation with teeth in a patient who is already emotionally upset.

In another group, the dental situation was traumatic to the patients because they were already deeply involved in tense life situations which made them "nervous and on edge" and therefore unable to tolerate pain. Laszlo Schwartz has suggested that excessive pain, sudden pain in the teeth or prolonged or excessive opening of the mouth may evoke a compensating extended contraction, just as the stretch reflex may operate on other skeletal muscles. This would then produce a prolonged tonic spasm of the jaw muscles such as is found in bruxism. The lack of relaxation and resulting dysfunction of the temporomandibular joint then produces more pain and a vicious cycle ensues. This is comparable to other psychosomatic syndromes such as low back pain, where emotional tension may lead to muscle spasm and pain, which

further limits motion, and then this new dysfunction leads to more pain.

From a psychiatric standpoint, only 4 of the 35 patients seemed to be relatively healthy people. These four had problems in living, as everyone does, but given time and the chance for careful thought they seemed able to handle their problems. Two of these definitely profited from the psychiatric interview. It helped them to focus on their problems and to cope with them more effectively. Twenty patients were conspicuously anxious and tense. The remaining 11 were psychotic or prepsychotic (six were essentially schizophrenic, four had been suicidal, and another had had shock therapy for involutional depression).

The complaints of schizophrenic patients were diffuse and dental pain was only incidental. Where dental trauma had been a major factor, the pain tended to be acute, often with radiations along more reasonably related lines with the cyclic process described earlier perpetuating it. In those patients whose chronically tense life situations seemed to play the most important role, the physical mechanism was most apt to be chronic bruxism. An outstanding characteristic of these patients was strong anger which required inordinate effort to repress and control. The patient would "clench his teeth rather than risk saying what he felt." In many of these patients the anger was directed against the spouse who was described as inadequate or a financial failure who had not fulfilled the patient's dependency needs. Marriages were conspicuously miserable in 12 instances.

Another frequent target for anger was a domineering, strict or even cruel mother on whom the patient was dependent. In seven patients an important precipitating factor for the dental problems was the death of a parent on whom the patient had been unusually dependent. In several instances the difficulties stemmed from the patient's excessive dependence on the marital partner rather than on the parent. An example of this was a woman in her late forties, who told of several upsetting events that had been superimposed on each other. She had had an artificial menopause five years before because of uterine fibroids; the operation had come as a surprise. She had never had children, although she was a teacher and would have liked them. Shortly after this she had had a painful extraction of a tooth done without anesthesia, and had complained of pain in her jaw ever since that time. She began a round of dental consultations to discover the cause of the pain, but in her mind she was afraid of cancer of the jaw. Three years before her father had died and she and her husband had moved into her mother's house, which had resulted in an extremely tense and unhappy domestic situation. For many years it had been known that she ground her teeth. This habit had become more severe as her tension increased, so that finally she had had to give up her teaching job, only to discover that this did not give her peace but increased her restlessness.

Her face was rigid with self control and smothered resentment; she complained only of her teeth and the anger she felt at her husband's financial failure, her childless fate, and her mother's control over her to the point that she didn't dare smoke at home. These facts came out with careful history-taking, and they were more than confirmed by her family doctor. At the time she was seen she complained of an unbearable tension in her face and pain radiating down her right jaw into her chin and neck. Efforts at "rehabilitation of the bite" had not helped her, and she was extremely anxious for neurosurgical and other consultations to find the "specific cause" so that something "effective" could be done about it.

In contrast to this group of hostile, angry people who were overtly dependent, there was another group of five women with noticeable bruxism who

were unusually competent, successful, effective people. All supported themselves and were interested in their work; however, they were exacting, perfectionistic, obsessive people who tended to domineer and were secretly hostile. They were especially hard to handle as dental patients because they wanted to dictate the exact methods of treatment, indicating that they knew better than the dentist just what "bite" they needed. They were unwilling to compromise. Great leeway was given to one patient to have her bite theories realized, and she grew terribly anxious when her theories did not work and she was left without a rationalization for her difficulties.

COMMENT

It is obvious from this summary of etiologic factors that there was a great deal of overlapping; it usually took more than one factor to produce the clinical picture of recalcitrant pain. For instance, a tense obsessive woman, who had the habit of bruxism, found it necessary to return to work at a menopausal age in order to support her irritable, chronically ill husband. In attempting to control her resentment, she grew depressed and cried when alone. She found herself grinding her teeth more frequently. On a routine visit to her dentist, she had mentioned her habit and he had started "grinding down her teeth" in the hope of curing the bruxism through improvement of the occlusion.

Instead of solving the patient's problem, the treatment simply served to focus her whole attention on her mouth. The pain in her teeth increased. She could neither sleep nor eat, and she felt that her whole face was changing shape. She sought and received progressively extreme treatment with complete bite rehabilitation that included multiple porcelain jackets. She then reported such "pressure" in her ears that she could not chew. Since then she has responded more favorably to a slow, cautious approach which involved minimal care; only those replacements that were absolutely necessary were made.

Some problems in the care of these patients arose because of the patients' tremendous need to find a "specific" and "effective cure" for their difficulties; their "difficulties" very often being a combination of minor dental irregularities and long-standing life problems. A simple solution to such a complicated situation is unrealistic and equivalent to a deep wish on the part of the patient for "magic." The tense life situation often had been built up over several years, and at some especially critical point dental symptoms occurred. The patient, often unwittingly assisted by the dentist, would then tend to focus on the dental problem as a distraction from or a substitute for seemingly insoluble life problems. Such patients tend to crave chronic support from a doctor and are afraid to show too much improvement because it will mean leaving him. Often when the termination of treatment seemed to be imminent, symptoms would recur with severity or new symptoms would appear. Several patients asked to be hospitalized, many wanted surgery, and the vast majority wanted more tests conducted and more doctors called in for consultation.

It was clear that these patients were looking for some sense of being taken care of in a much more total fashion, one which transcended the scope of dentistry. They were excessively dependent and often ingratiating and pleading, but at times they would get excessively angry at the doctor for not producing a cure. They would project their feeling of frustration onto the doctor for not solving their total problem.

One patient became involved in a lawsuit for malpractice against a dentist; this was the third such lawsuit she had instituted. In several other instances the patients felt so abused and "let down" by dentists that they now felt the dentist

owed them free care, and the routine payment of bills became a problem even when these were minimal or on a clinic basis.

SUMMARY OF OBSERVATIONS

Observation of these patients indicates that the results were poorest where the need for focusing on physical problems had been so reinforced by previous excessive treatment that a conservative approach had become totally unacceptable to the patient. They could no longer be stopped in their pursuit of a final authority who would have the "right magic answer" to cure them. Once radical treatment had been tried, the patient seemed unable to go back to simpler methods, as though she could not bear to undo tedious dental work, possibly because this would lead to too much rage and remorse at the unnecessary pain she had experienced. The focus on physical problems may also have grown too strong to be abandoned. A possible analogy might be that these patients become addicted to physical procedures to relieve anxiety as one becomes addicted to drugs.

On the other hand, the best results were seen in those whose illness was either of shorter duration, or where no physical treatment had been given, therefore over-treatment could be avoided before it had been experienced. A good example of this was seen in a woman who was in the process of recognizing an impossible life situation. She had to face the fact that the spastic son to whose education she had devoted her life was not only unable to go further but had, for practical purposes, a very low I.Q. of which she had not been aware. A father and a father-in-law had died recently, and she had been left with very little to look forward to and consequently was depressed. During this period she had had a tooth extracted. She did not recover from the operation normally and had continued to experience pain and foul smelling mucus from the area. Bruxism had increased after the extraction. There was good evidence that the pain was mainly muscle spasm, and there was no evidence that the site of the extraction was a real source of trouble.

It was suggested that she try to control the bruxism as much as possible, that she do some exercises to relieve the muscle spasm, and that she use mouthwashes to relieve the foulness. It was thought that the latter was worse because muscle spasm prevented proper activity of the mouth and drainage of the area.

These simple procedures, plus the encouragement and the interpretation of symptoms on the part of the dentist, seemed to relieve the difficulties adequately, and no extensive or complicated treatment was necessary. Given the hopelessness of her domestic situation, which was bound to continue producing anxiety, this woman might well have continued with pain throughout a long drawn out plan of dental treatment and "bite" rehabilitation. The one psychiatric interview that she had may have contributed to her acceptance of her situation and lessened her feeling of guilt.

COMMENT

Experiences such as have been described suggest that dental therapy and prevention should take into consideration not only the patient's dental but also his personality problems. The dentist may actually encourage the emotionally upset patient to focus attention on his mouth simply by pointing out imperfections or clicking in the mandibular joint—manifestations that may not trouble the patient. It would seem best, then, to caution the dentist against showing an overly zealous interest in minor problems. In other words, with the over-anxious patient, "let well enough alone." It also seems wise to avoid extensive restorative procedures, so-called rehabilitation, in the mouth to relieve bizarre and obscure

complaints. Since these so often arise as the result of emotional distress rather than actual dental disease, the intended cure serves to reinforce the patient's awareness of his dental problem. Since he is already tense, he has much less than the normal power to adjust to a new dental situation. Such patients should be encouraged to bear with minor discomforts. They should be helped to adjust to them rather than be given new sources of discomfort or led to hope for unrealistic improvements.

The use of ethyl chloride spray or the infiltration of procaine is sound from the psychiatric point of view in that it interrupts the cycle of pain and muscle spasm without adding a new or additional source of pain to which the patient must adjust. If the dentist also takes the time to caution such patients against seeking excessive dental treatment, it may encourage them to wait for gradual improvement. Since these patients tend to crave attention, it is most necessary in the evaluation of therapeutic agents to have a control group in which placebos are used. Temporary improvement for the duration of an experiment possibly could be attained by suggestion rather than by the physical effect of the agents.

It is often helpful to make the patient aware of the occurrence, frequency and consequences of bruxism. A certain amount of voluntary control of the habit may be established in some people. In others, the sources of anxiety may be too deep and the habit too fixed to respond to voluntary control.

The majority of the patients examined do not want psychiatric help; they want dental help. Since this is true, a rational and understanding dental approach is most practical and appropriate.

Dental pain

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The management of pain is one of the most difficult problems confronting the dentist. Because of the endemic nature of dental caries, almost everyone has experienced the pain resulting from dental disease and the relief afforded by dental treatment. It is not surprising, therefore, that pain in the orofacial region will frequently bring a patient first to his dentist in the hope of prompt diagnosis and immediate relief. The patient often is certain that a tooth must be at fault. Unfortunately, in many instances, neither the prompt diagnosis nor the immediate relief may be forthcoming.

The complex innervation of the maxillofacial region, the variations in pain perception, and the phenomenon known as referred pain often make diagnosis difficult. This is true even though a tooth is at fault. It is only after careful study

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of the patient's history, a searching clinical examination, together with adequate roentgenograms and pulp testing, that the role the dental structures play in causing pain can be evaluated. Proper interpretation of the data so gathered requires an adequate understanding of the nerve distribution in the face, the pathologic processes involved, as well as of the physiology of pain.

DENTAL NERVES

From the dental standpoint it is the fifth nerve with its three major divisions that is most often involved in pain conduction. This is not only the largest of the cranial nerves, but has the most extensive peripheral distribution in the regions under discussion. Furthermore, the most frequent sites of origin of painful stimuli along the branches of the fifth nerve are the teeth with their high vulnerability to disease.

The dental nerves, after entering the roots accompanied by blood vessels and lymphatics, lose their medullary sheaths as they approach the coronal portion of the dental pulp and divide into many small bundles, thus forming an extensive network of neurons. Many of the small nerve fibers end in fine club-shaped knobs dispersed through the pulpal tissue and, having lost the medullary sheaths, are now bare terminal nerve endings, extremely sensitive to stimuli. These nerve endings are, like those in the cornea, capable of transmitting only one sensation—pain—regardless of the specific stimulus, be it thermal, chemical or mechanical. Bare pain receptors alone, among all the sensory end-organs, seem to lack the facility of adaptation and will maintain undiminished transmission of impulses as long as stimulation continues.

This anatomic and physiologic arrangement—namely, many bare sensory end-organs widely distributed through the fibrous network of the pulp that are capable of transmitting only the sensation of pain, regardless of the type of stimulus—explains the frequency, ease and rapidity of sensations of pain coming from the teeth. The importance of the blood vessels also cannot be minimized. Any inflammatory reaction, however slight, is enough to produce pressure on these sensitive receptors within the hard, unyielding pulp chamber and canal. The progressive symptoms of this reaction are: (1) hypersensitivity, (2) throbbing and (3) intense steady pain as neuritis develops and circulatory stasis and necrosis ensue.

LOCALIZATION OF PAIN

The widespread distribution of nerve endings and the fact that the sensory end-organs can transmit only sensations of pain account for the frequent inability to localize the pain in an offending tooth. This is the background of the phenomenon of "referred pain" wherein a peripheral stimulus elicits a pain response that may seem to come from another of the many branches of the same nerve. Thus it is of some diagnostic value to remember that pain in a lower tooth is referred back to the ear, while pain in an upper tooth may be referred to the eye or upper part of the face. It is hardly necessary to point out that the pain is never referred to the opposite side of the face.

A more important diagnostic sign in localizing dental pain is tenderness on slight percussion of the tooth. This tenderness is due to the fact that the tissues surrounding the teeth, unlike the dental pulp, are rich in tactile sensory organs which react to pressure, especially when irritated by inflammation and hyperemia.

Although the dental pulp itself can respond to stimuli only by pain sensation, the reaction of the tooth to thermal changes is of value in determining the progress of pulpal disease. The normal pulp responds quickly to extremes of heat or cold, but the pain response leaves rap-

idly as soon as the stimulus is removed. This is not true if the pulp is diseased or inflamed. At first the pulp becomes hyperalgesic, reacting more violently to lesser extremes of temperature. As true pulpitis develops, response to cold decreases and eventually disappears, while heat now causes severe aching pain that persists for longer and longer periods of time. Whereas local sedation (such as eugenol applied topically) may give temporary relief, pulpitis is, as a rule, irreversible, terminating in necrosis of the pulp. Thus a pulp tester capable of measuring the threshold of response in microamperes is of value in judging the progress of dental pulp disease.

DENTAL PAIN FROM OTHER CAUSES

Pain referred to the teeth from disturbances elsewhere is encountered often and frequently presents a difficult diagnostic problem. Maxillary sinusitis or neoplasms within the sinus often present toothache as the predominant early symptom. This toothache is caused by irritation of branches of the middle superior alveolar nerve, which branches off the infraorbital nerve of the maxillary division of the fifth nerve. This nerve supplies not only the maxillary sinus but the upper bicuspids and has anastomoses with the posterior superior alveolar branches supplying the upper molars and the anterior superior alveolar branches supplying the upper cuspid, the lateral and the central incisors.

In the same way and for the same reason—that pain is the only response to stimuli to the dental pulp—many disorders as varied as stomatitis, herpes zoster or developing brain tumors may cause referred pain characterized as "toothache." Only by careful differential diagnosis can the source of stimulus be traced, and the dentist must be on guard constantly not to extract teeth haphazardly at the behest of the suffering patient.

FACIAL NEURALGIAS

The facial neuralgias are of importance in any discussion of maxillofacial pain, and a few points of differential diagnosis should be mentioned. Unlike neuritis of the dental nerves, in which the pain is continuous or almost so, the pain of true neuralgia is always paroxysmal in character and usually more severe in its attacks. Difficulty in diagnosis occurs most often in the early stages of the neuralgia or in individuals whose pain threshold is high. With these patients, the well-known "trigger zones" must be searched for, and all diagnostic criteria evaluated carefully. The neuralgias of the orofacial region are not uncommon, and include in addition to trifacial neuralgia or tic douloureux, Sluder's syndrome, or sphenopalatine neuralgia, and glossopharyngeal neuralgia. The temporomandibular joint syndrome and muscular spasm occur much more frequently. They will be discussed in another paper in this symposium.

COMMENT

In conclusion, it is hardly necessary to point out that maxillofacial pain is a common complaint, the management of which may seriously tax the resourcefulness of the dentist. He should therefore utilize all diagnostic methods at his command, including careful examination, roentgenograms, pulp tests and procaine blocks, before embarking on surgically destructive treatment. It is well to remember that most diseases of the dental pulp are progressive, and that usually the signs and symptoms of an unmistakable clinical picture will eventually unfold. Therefore, when the diagnosis is obscure, it is wise to gratify the patient's desire for immediate relief by the use of analgesics and to watch the course of the disease. Much can be gained by observation and consultation. Time is a valuable ally in the diagnosis of orofacial pain of obscure origin.

Otolaryngeal sources of pain

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Any discussion of otolaryngeal sources of pain must, of necessity, stress the importance of differential diagnosis.

Pain arising from the diseased nose or sinus is frequently referred pain. It may be present in a region of the head remote from the nose and sinuses. In addition to the pain and tenderness localized over the diseased sinus, considerable pain may be experienced in regions supplied by the three branches of the trigeminal nerve. This constitutes a major difficulty in the differential diagnosis of pain caused by dental and sinus disease.

Although there is still much to be learned about the pain-sensitive structures of the nose and paranasal sinuses, useful data have been obtained from clinical observation and experimental studies. For example, diagnostic exploration of the maxillary sinus with a blunt cannula causes pain in the upper back teeth even if the sinus is not diseased. The region of the middle meatus of the nasal cavity through which the cannula is passed is located more than one inch from the molars. This clearly indicates that pain in the teeth may be referred from the region of the anterior ethmoid sinuses. Increased pressure on pain-carrying nerves of the sinuses is another causative factor in the pain mechanism. Pain caused by a hematoma in the maxillary sinus is a good example of the latter mechanism.

A statement by a patient that he or she has sinus disease or sinus headaches should be accepted with considerable caution. In my experience, not more than 20 per cent of the patients who say they have sinus headaches and have been treated for sinus disease, have any disease in the sinuses. In a sizable number of these patients, it is purely a psychosomatic problem.

DIFFERENTIAL DIAGNOSIS

Only a careful history, the taking of which may be time consuming, can result in the necessary information for a correct diagnosis. The value of a thorough history is comparable to that of a complete physical examination. Routine roentgenographic studies reveal disease in some patients who are not subject to headaches and pains. Therefore, evidence of sinus disease does not necessarily mean causative relationship to the patient's headaches.

When the pain or headache is associated with sinus disease, it is usually continuous, aching, dull and deep. It is rarely very severe, except if acute sinusitis is complicated by periostitis or osteomyelitis. The pain caused by allergic swelling of the mucous membranes is similar to that caused by infection. There is satisfactory evidence which points to nasal allergy as the cause of

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headaches. Prompt control of such headaches by the use of antihistamines is frequently achieved in such cases. This drug improves the patency of the nasal passages.

Acute inflammatory disease of the maxillary sinus may give rise to pain in the upper molars and bicuspids along the zygoma and in the temporal region. Pain and tenderness over the canine fossa and infraorbital region is, however, the most constant symptom.

Diseased frontal and ethmoidal sinuses less frequently cause referred pain into the upper teeth.

It is of questionable value to talk about the so-called "typical" pain caused by any individual sinus. Pain may spread to a larger or smaller region supplied by the fifth cranial nerve, depending only on the intensity and duration of the primary pain. Furthermore, in many instances two or more sinuses are simultaneously involved in the production of the pain. Nevertheless, it could be said that frontal sinus headache usually manifests itself over the frontal region, ethmoid disease between and back of the eyes, and the relatively rare sphenoid sinusitis over the vertex and in the occipital region.

Clinical examination, including transillumination and roentgenographic studies, provides valuable information as to the presence of disease in the sinuses. There is still considerable confusion about the interpretation of roentgenograms of the sinuses. The diagnosis of sinusitis is made much too frequently. It is useful to remember four basic principles that are valid with few exceptions.

1. Sinuses that are clear in roentgenograms are rarely responsible for headaches or toothaches. (One exception is the so-called vacuum headache.)

2. Positive roentgenographic observations may be due to other conditions than pain-producing sinusitis. Allergy, simple nasal obstruction, ordinary head cold, old scars, and infection of the sinuses in most instances manifest identical changes in the mucous membranes as demonstrated in roentgenograms.

3. Often roentgenographic evidence of recovery of the mucous membranes will not be obtained until weeks after the clinical cure of the infection.

4. Direct visualization with nasal speculum and nasopharyngoscope gives much more reliable information about disease of the nasal cavities than do roentgenographic studies.

If the roots of the upper teeth project into the maxillary sinus, or the dental alveoli are separated from the sinus by a thin bony lamella, infection of the tooth may spread to the sinus. The existence of a dental pathologic condition should be routinely ruled out if there is persistent, purulent unilateral nasal discharge.

Upper teeth that are diseased may give rise to aches over the zygoma, the temporal region and sometimes over the eye, in addition to local pain over the tooth involved. The lower teeth, especially the molars, may cause pain in the mandible and the maxilla, the lower half of the temporal region, and perhaps most commonly of all, in the ear. The pain is usually a deep, dull ache. If extremely intense pain is present, regions supplied by both the second and third branches of the trigeminal nerve may be involved independently of the site of the tooth involved.

It is evident from clinical observations and experimental studies, therefore, that referred pain originating in the sinuses or in the teeth may be projected into the same region. Sinus disease may be disguised as dental disease or vice versa.

Local anesthesia of the suspected tooth may be a valuable short cut to the differential diagnosis. If the headaches and pains are eliminated by this method, it indicates a causative relationship between dental disease and the pain located in the remote regions of the head.

Whereas differential diagnosis between dental and sinus pain is a more frequent

problem, it is important to point out that a differential diagnosis between migraine and dental pain also may be required in this region. Migraine headaches tend to be periodically recurrent and usually unilateral, but may become generalized. Duration of each attack may vary from a few hours to many days. Frequently more than one member of the family is subject to headaches.

Migraine pain usually is throbbing, and its distribution roughly follows the branches of the external carotid artery. There is adequate evidence that migraine headaches are closely related to dilatation and distention of the extracranial arterial walls. Migraine, if manifested in the upper teeth or jaw, gives rise to severe throbbing pain. The patient's past history, a prompt response to ergotamine tartrate and alleviation of pain on compression of the homolateral common carotid artery, point to migraine and constitute valuable differential diagnostic procedures.

Pain may be present in the upper and lower teeth, the maxilla and the mandible without any evidence of dental pathologic condition during attacks of sphenopalatine neuralgia, so-called histaminic cephalalgia, and other atypical neuralgias. The exact nature of these disorders is not yet known. They possess none of the characteristics of the major neuralgias. It is most likely that they are related to the migraine mechanism.

COMMENT

The otolaryngologist frequently is the first one to see patients with so-called temporomandibular joint disorders because the referred pain in the ear may become troublesome. Different workers have stated the belief that this syndrome may cause hearing loss. Patients who were aware of hearing loss or tinnitus were studied from the otological point of view. Objective hearing loss has been demonstrated by audiometric studies in some of these patients. Clinical study of these patients, however, revealed causes for deafness which bore no possible relationship to temporomandibular joint dysfunction. Therefore, it was concluded that this syndrome does not cause hearing loss or tinnitus.

The otolaryngologist and the dentist must combine their diagnostic skills if the management of patients with maxillofacial pain, or even headaches, is to be carried out properly.

The Value of Facts • Good experimental facts have a permanent value: they might be compared to the indestructible stones of a building; the building, that is, the scientific system, is bound to become obsolete and to be wrecked sooner or later, but the good stones will be used again for the new building. *George Sarton, Introduction to the History of Science.*

Histologic study of the effect of antiformin on the soft tissue wall of periodontal pockets in human beings

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The drug antiformin, described in 1913[1] as an adjunct in periodontal therapy, has been discussed again in recent literature.[2-4] The latter articles are somewhat detailed as to the manner in which this drug acts as an aid in periodontal pocket elimination. They suggest that the action of antiformin "is almost specifically limited to the epithelial structures connected with the pocket"[2] and that "it does not appear to enter into any appreciable reaction with the underlying connective tissue within the two-minute time limit."[2] It is also noted that antiformin is capable of specifically "searching out" the epithelial lining of periodontal pockets as well as the epithelial projections into the adjacent connective tissue and automatically effecting thorough dissolution of the epithelium.[3] Additional qualities attributed to antiformin include a tendency to soften tartar, dissolve microorganisms and necrotic tissue and effect a styptic action.[2]

The fact that the solvent action of antiformin appeared to be specific for epithelium, while adjacent connective tissue of the pocket was comparatively unaffected, if the period of drug action were limited to two minutes, seemed worthy of investigation. An experiment was undertaken, therefore, to study the tissue changes which followed the introduction of antiformin in periodontal pockets in human beings.

EXPERIMENTAL PROCEDURE

Antiformin, an alkaline sodium hypochlorite solution containing about 7.5 per cent of sodium hydroxide and 5.2 per cent of available chlorine, was used in the treatment of 27 periodontal pockets in nine patients in accordance with the prescribed method of application described in the literature.[2,3] A purple dye (Metacresol purple — Shaw Research, Omemeem, Ontario, Canada) was used to color the antiformin to facilitate its detection in the pocket.[4]

The antiformin was applied as follows: The experimental area was walled off

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with cotton rolls and the teeth and gingiva dried. A "shovel shaped" commercial applicator manufactured for this purpose was dipped into the antiformin. The instrument with adherent antiformin was passed into the pocket, the concave surface of the instrument facing the tooth, until the base of the pocket was reached. The instrument was then moved laterally along the base of the pocket, so that the antiformin could reach the entire soft tissue wall of the pocket. This application procedure was repeated two or three times during the experimental period. Experimental periods of two or four minutes were used.

At the end of the experimental period, the antiformin was neutralized with 10 per cent citric acid. The citric acid was applied to the gingival margin with a cotton pellet saturated with the solution, and was then introduced into the pocket with the applicator described earlier. Applications of citric acid were repeated until the purple antiformin was decolorized. The patient then rinsed his mouth with warm water.

As the antiformin was introduced in the pocket, a light purplish gel-like mass welled out onto the gingival margin. This changed to a straw color in the course of neutralization with the citric acid. The gel at the gingival margin was lifted away with a Towner scaler U15. To remove the gel from within the pocket, a Towner scaler U15 was inserted the entire depth of the pocket and moved laterally; however, contact with the tissue at the base of the pocket was retained. At the same time, an attempt was made to engage the lateral soft tissue wall. A Towner hoe instrument was then inserted to the base of the pocket and, with the cutting edge in contact with the soft tissue wall, the instrument was drawn slowly toward the gingival margin, lifting the gel to the surface.

To obtain tissue for microscopic study, the soft tissue wall of the pocket was resected at a level which appeared to be below its base. Immediately after these procedures were completed, the tissue was fixed in an alcohol-Formalin mixture and stained with hematoxylin and eosin and also by the Hotchkiss leucofuchsin periodic acid method.[5] For the purpose of comparison, untreated periodontal pockets immediately adjacent to those treated with antiformin were resected and similarly prepared for microscopic study.

OBSERVATIONS

Untreated Pockets Adjacent to Those Treated with Antiformin • The untreated pockets adjacent to those treated with antiformin varied in depth but presented comparable microscopic features. In general, there were varying degrees of hyperplasia of the pocket epithelium with budlike epithelial extensions into adjacent connective tissue. The connective tissue was moderately edematous with focal accumulations of leukocytes distributed adjacent to the epithelium along the entire length of the pocket. In isolated areas, there was leukocytic infiltration into the epithelium with an associated vacuolization and degeneration of the epithelial cells. In the area of attachment at the base of the pocket, the epithelium was comparatively thin and multilayered, varied in length, and could be differentiated clearly from the hyperplastic epithelium of the pocket wall (Fig. 1).

Two Minute Application of Antiformin • After a two minute application of antiformin, the lateral wall of the pocket, which extended from the gingival margin to the area of attachment, was invariably denuded of epithelium (Fig. 2). In some instances, strandlike remnants of necrotic tissue partially adhered to the connective tissue. Occasionally, epithelial projections deep in the connective tissue wall

5. Turesky, S.; Glickman, I., and Litwin, T. Histochemical evaluation of normal and inflamed human gingivae. J.D. Res. 30:792 Dec. 1951.

Fig. 1 • Untreated periodontal pocket showing hyperplasia of the epithelial lining with edema and leukocytic infiltration. There is chronic inflammatory involvement of adjacent connective tissue. Epithelium at base of pocket in region of attachment is comparatively thin

were intact in pockets in which the epithelial lining was destroyed (Fig. 3).

In the area of attachment at the base of the pocket, the findings were not as consistent as those observed in the lateral wall. In some instances, the epithelium in this area was destroyed; in others, a thin strip of epithelium remained intact in the area of attachment.

In all instances, the connective tissue which was denuded of epithelium presented alterations that were not observed in the untreated pockets. A border of degenerated and necrotic tissue extended from the gingival margin to the base of the pocket (Fig. 2, right, and 3). The regular clean-cut linear pattern of the connective tissue fibers was destroyed and replaced by a homogeneous, deeply-stained, shriveled and partially fragmented mass. The nuclei were pyknotic and hyperchromic. The width of the border zone of degenerated connective tissue varied in different instances. In all of them, however, it was clearly differentiated from the connective tissue deeper in the pocket wall. In the sections prepared by the Hotchkiss leucofuchsin staining method there was evidence of depolymerization of the ground substance and clumping of the collagen fibers in this zone of degenerated connective tissue.

Four Minute Application of Antiformin • After the four minute application of antiformin, the changes were similar to, but slightly more extensive, than those observed in the pockets studied after the two minute experimental period.

DISCUSSION

The findings indicate that antiformin is a nonspecific necrotizing drug that destroys connective tissue as well as epithelium. The extent of destruction of the pocket epithelium varied in different instances. In some, the epithelium along the entire wall as well as in the area of attachment was destroyed. In others, either the epithelium in the area of attachment or remnants of epithelial projections from the lateral pocket wall into the adjacent connective tissue were intact.

Deep epithelial projections from the pocket lining apparently escaped the effect of the drug, despite the fact that a considerable portion of the connective tissue was destroyed. Since there was reasonable uniformity in the technic with which the antiformin was applied, it may be assumed that the afore-mentioned variation in the effect of drug resulted from differences in the degree of epithelial degeneration and proliferation that existed before it was applied.

It is noteworthy that there was some

degree of destruction of the connective tissue beneath the epithelial lining in all instances in which the drug was used. The altered connective tissue presented diffuse changes that were not observed in the nontreated pockets. The impression created by the findings is that of a nonselective destruction of the tissues in the pathway of the drug as it permeates from the epithelial surface deeper into the pocket wall. Destruction of the epithelial lining was a consistent finding, while the extent of degeneration and necrosis of the connective tissue varied with the penetration of the drug.

Because it is obviously impossible to obtain the microscopic features of the same pocket before and after treatment, adjacent untreated periodontal pockets were used as indexes of the pathologic changes likely to have existed before antiformin was applied in the treated pocket. This introduces an unavoidable experimental variable which diminishes in likely significance with the increase in the number of pockets studied. The microscopic features observed in the untreated pockets were those generally accepted as pathognomonic of the periodontal pocket. In fact, the therapeutic effectiveness attributed to antiformin[3] is predicated on the premise that it is to be used in a pathologic environment entirely comparable to that of the untreated pockets in this study. There is no reason to assume that the treated pockets were initially unique and differed from the untreated ones. The uniformity in the

Fig. 2 • Left: Periodontal pocket after two minute application of antiformin. Survey view showing pocket wall denuded of epithelium. There is border zone of necrotic tissue which extends along the pocket wall and is clearly differentiated from the subjacent connective tissue. Right: Periodontal pocket after two minute application of antiformin. Detailed view of region at left showing contrast between zone of necrotic connective tissue lining the pocket (right) and adjacent inflamed connective tissue. The nuclear pyknosis and deep staining and granular fragmentation of connective tissue fibers in the necrotic zone can be noted

Fig. 3 • Periodontal pocket after two minute application of antiformin showing border zone of necrotic connective tissue which is denuded of lining epithelium. An epithelial projection is shown in cross section deep in connective tissue beyond zone of necrosis

changes observed in the pocket wall after the use of antiformin is definitive evidence of its destructive effect on both epithelium and connective tissue. In this connection our findings corroborate those of Hunter[6] who described a nonspecific necrotizing effect of antiformin on animal and human gingival tissue.

It is not within the scope of this discussion to enter into a general evaluation of the wisdom of periodontal treatment technics which rely on the use of drugs to aid in pocket elimination. Our purpose was to pursue an objective microscopic study of the effect of antiformin on the soft tissue wall of periodontal pockets, making every effort to conform to the prescribed method of usage. Our conclusion was that the assumption that antiformin exerts a selective solvent effect on the epithelium of periodontal pockets is not valid.

SUMMARY

Antiformin was applied to the soft tissue walls of periodontal pockets in human beings for periods of two and four minutes. At the end of the treatment period, the alkaline (caustic) solution was neutralized with a 10 per cent solution of citric acid. The effect of the drug was studied by the examination of microscopic sections. The findings after both the two and four minute applications indicate that antiformin is a nonspecific necrotizing drug that destroys connective tissue as well as epithelium.

6. Hunter, H. A. A study of tissues treated with antiformin-citric acid. J. Canad. D.A. 21:344 June 1955.

East and West • In the Middle Ages, the difference between East and West was not very great. The leading philosophers of all countries were engaged in the same sort of activity. Before the twelfth century, one of the Eastern groups, the Muslim, was considerably ahead of all the others, East and West. Muslims were then in the van of mankind. From the twelfth century on, the supremacy passed gradually to the Latin world, but this process was not completed until the end of the Renaissance, when the laicization of Western science was well under way. *George Sarton, Introduction to the History of Science, vol. 1, p. 28.*

American Dental Association specification no. 13 for self-curing repair resins (effective January 1, 1956)

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1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification is for self-curing resins used primarily for repairing denture base resins.

1.2 Types and Classes. Repair resins covered by this specification shall be of the self-curing type, powder and liquid class, and shall be of two colors, pink and clear.

2. APPLICABLE SPECIFICATIONS

2.1 Specification. American Dental Association Specification No. 12 for Denture Base Resin (Acrylic Resins or Mixtures of Acrylic and other Resins), Second Revision, as it applies to Type II self-curing resins forms a part of this specification.

3. REQUIREMENTS

The repair resins shall conform to all requirements of American Dental Association Specification No. 12 applicable to Type II self-curing resins with the following two exceptions. Paragraph 3.4.1 and Paragraph 3.4.7 shall be changed to read:

3.4.1 Working Qualities. The self-curing repair resin shall yield a satisfactory repair when processed according to instructions furnished by the manufacturer.

3.4.7 Transverse Deflection. The deflection of at least three of the five specimens prepared as outlined in 4.3.5 shall meet the following requirements when tested in water at 37 ± 1°C. (98.6 ± 1.8°F.).

DEFLECTION

Class	For loads* 1,500 Gm. (3.31 lb.) to 2,500 Gm. (5.51 lb.)		For loads* 1,500 Gm. (3.31 lb.) to 4,000 Gm. (8.82 lb.)
	Max.	Min.	Max.
Self-curing repair resins	mm. 1.5 (0.059 in.)	mm. 1.0 (0.039 in.)	mm. 4.5 (0.177 in.)

*Deflections shall be measured from an initial load of 1,500 Gm. (3.31 lb.) to the load indicated.

4. SAMPLING, INSPECTION, AND TESTING PROCEDURES

Sampling, inspection, and testing of the repair resins shall be conducted as described in A.D.A. Specification No. 12.

5. PREPARATION FOR DELIVERY

The packaged resin shall conform to the packaging and marking requirements of A.D.A. Specification No. 12.

The publication of this specification was authorized by the National Bureau of Standards and the Council on Dental Research of the American Dental Association. The specification was approved by the Board of Trustees of the American Dental Association at its March 1955 meeting. It will become effective January 1, 1956.

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Dimensional stability of self-curing denture base acrylic resin

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One of the advantages of the self-curing acrylic resins for the construction of denture bases is assumed to be accuracy of fit. All observations on this subject appear to be somewhat qualitative and subjective with the exception of those made by McCracken.[1]

McCracken found by measurement that the linear curing shrinkage of the self-curing acrylic resin was less than that for the heat-curing resin, and that after a five-day immersion in water the shrinkage was compensated.

It was thought best to study such dimensional changes further in reference to some of the common variables found in various processing methods. The study was conducted in two stages. The first stage was concerned with the dimensional changes which occurred in denture bases without teeth; the second stage included the study of complete maxillary dentures containing both porcelain and acrylic resin teeth.

DIMENSIONAL STABILITY OF DENTURE BASES

The master model used throughout this research was an edentulous maxillary reproduction, cast in aluminum with no undercuts. A Korogel mold was made of the model for the construction of all duplicate casts with Duroc. In every case, gauge marks were cut on the casts in the posterior ridge area. The distances between the gauge marks were carefully measured, and compared with the distances between their impressions in the denture bases and dentures constructed. The percentage of difference between the gauge marks on the casts and those in the resin was assumed to be a measure of the accuracy of fit in these regions.

Four different resins were used in the investigation. They are described in Table 1.

The flasking was accomplished in the regular manner, with special attention given to the method of trial closure to insure that the mold was filled properly. The same ratios of polymer to monomer for each resin were used throughout. Either the directions of the manufacturer were followed, or the correct proportions were gauged to give a dough of the proper consistency without the use of excess monomer.

All molds were lined with tin foil.

Summary of part of a thesis submitted by P. M. Jones in partial fulfillment of the requirements of Northwestern University for the degree of Master of Science in Dentistry (1954).

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1. McCracken, W. L. Evaluation of activated methyl methacrylate denture base materials. J. Pros. Den. 2:68 Jan. 1952.

Compression molding was employed in this part of the research; the flasks finally were closed under heavy pressure, without springs. In the case of resin A, the filled flask was held at 70°C. (160°F.) for nine hours and bench cooled. The self-curing resins were processed at room temperature for the times indicated in Table 2 (column 3). The measurements on the bases were obtained immediately after the base was deflasked and removed from the stone cast. After the initial reading, the bases were stored in water at 37°C. (99°F.), and remeasured at room temperature at the periods indicated in Table 2. The average of the results obtained from three denture bases in each case is presented in Table 2. The standard deviation for the determinations is approximately ±0.05 per cent.

Discussion • It is evident that the curing shrinkage of the bases made with self-curing acrylic resin is definitely less than that of the bases constructed with the heat-curing resin (Table 2, column 4). Such a conclusion is in agreement with the similar work of other investigators.[1,2]

The shrinkages observed are not true curing shrinkages, since they were computed by a comparison of the dimensions of the cast with those of the denture base, and were not directly related to the resin itself. When the self-cured denture base was allowed to remain in air (Table 2, series 6), a further shrinkage was observed, presumably the result of a further polymerization of the resin. The final value of the shrinkage after six weeks (−0.24 per cent) was approximately the same as that observed by Taylor and Frank[2] on resin strips, and it is not greatly different from the curing shrinkage of the heat-curing resin (Table 2, series 1).

When the various bases were immersed in water at 37°C., equilibrium conditions, so far as the dimensional changes were concerned, were reached in from three to four weeks for the self-curing resins, and in two weeks for the heat-curing resin. The values presented in Table 2 (columns 5-10) were computed on the basis of the original dimensions between the gauge marks on the cast, and consequently they represent the percentage of difference between the gauge marks on the base and those on the cast at each period of measurement.

It may be noted that the dimensions of the base were increasing during the period of observation, presumably because of the sorption of water. There is no evidence of a contraction as was

Table 1 • Acrylic resins used

Resin	Trade name	Manufacturer	Composition
A	Cal Acrylic*	Cos Laboratories, Inc.	Unknown
B	Cal Acrylic (modified)		Monomer: 2 drops of dimethyl-p-toluidine to 5cc. liquid
			Polymer: 0.1 Gm. benzoyl peroxide to 12.5 Gm. powder
C	Acrolite 88 (Tissue Tone)	Acrolite Co., Inc.	Unknown
D	Special resin		Monomer: Du Pont methyl methacrylate H112, 99.5%; dimethyl-p-toluidine, 0.5%
			Polymer: Du Pont polymethyl methacrylate, HG 4 fine, 99.5%; benzoyl peroxide, 0.5%

*A heat-curing resin; all others are self-curing resins.

2. Taylor, P. B., and Frank, S. L. Low temperature polymerization of acrylic resins. J.D. Res. 29:486 Aug. 1950.

Table 2 • Dimensional stability of acrylic denture bases

Series	Resin no.	Curing time (hrs.)	Curing shrinkage (%)	Dimensional change during storage*					
				1 wk. (%)	2 wk. (%)	3 wk. (%)	4 wk. (%)	5 wk. (%)	6 wk. (%)
1	A	9 (70°C.)	−0.33	−0.18	−0.16	−0.16	−0.15	−0.15	−0.14
2	B	1	−0.01	+0.01	+0.04	+0.11	+0.16	+0.19	+0.22
3	C	1	−0.01	+0.04	+0.12	+0.16	+0.19	+0.21	+0.24
4	C	2.5	−0.08	−0.06	+0.01	+0.06	+0.11	+0.15	+0.18
5	C	15	−0.03	+0.05	+0.08	+0.20	+0.20	+0.24	+0.25
6	C†	16	−0.03	−0.14	−0.19	−0.20	−0.22	−0.25	−0.24

*Except as indicated, all of the bases were stored in water at 37° C.
†Stored in air at room temperature.

found in the resin base that was allowed to remain in air during this period as a control.

None of the bases attained a dimension equal to that of the original cast during the six week period. For practical purposes the bases constructed with the self-curing resins were approximately as much oversize as the bases constructed with the heat-curing resin were undersize.

It is of further interest that neither the composition of the self-curing resins nor the curing times were of consequence so far as their dimensional stability was concerned.

DIMENSIONAL STABILITY OF MAXILLARY DENTURES

The technical procedures employed in the processing of the experimental maxillary dentures were essentially the same as those described for the denture bases, with the exception of the modifications necessary for the insertion of teeth.

Identical sets of teeth (New Hue, molds 2N and 29S) were used in all of the 14 dentures processed. With the exception of two dentures in which acrylic teeth were used, all the teeth were of porcelain. A template was provided so that the teeth could be set in the same relation and position in each instance.

Two dentures were constructed with the heat-curing resin A, and self-curing resin D was used in the remaining ones. The mold was lined with tin foil as before, and the same curing cycle was used. Two dentures were processed with self-curing acrylic resin D according to each of the modifications indicated in Table 3 (columns 3 and 4). Measurements of the percentage of difference between the gauge marks on the dentures and those on the casts were obtained as before. These measurements are presented in Table 3.

Discussion • It is interesting to note that in every instance the curing shrinkage of the dentures (Table 3, column 5) is greater than that obtained with the denture bases without teeth (Table 2, column 4). This fact has been noted in other researches[3,4] with heat-curing acrylic resin dentures, and it is evidently true with self-curing dentures as well. This difference probably is related to strain release. The presence of the teeth in the denture base very likely results in more complex processing strains that are later released. The previous hypothesis that the data presented do not represent a true curing shrinkage is undoubtedly true in this instance.

3. Smith, E. H. Dimensional stability of acrylic resin dentures. Thesis, Northwestern University Dental School, 1947.

4. Darley, H. P. Strain release in acrylic resin dentures molded by injection. Thesis, Northwestern University Dental School, 1948.

The dentures cured at 37°C. (Table 3, series 5) exhibited a greater curing shrinkage than the dentures processed at room temperature. This effect may very likely be related to the thermal contraction of the denture from 37°C. to room temperature. The high thermal contraction of the resin during cooling is probably the principal cause of the higher curing shrinkage of the heat-cured dentures (Table 3, series 1) in comparison to that of the self-cured dentures.[5]

The low curing shrinkage obtained in series 2 (Table 3) may be related to the short curing time of one hour. The time allowed was probably not sufficient to complete the polymerization, and the denture may have been removed before the cure was effected. Further evidence for such an argument is the comparatively large dimensional change which occurred in the dentures during their subsequent storage in water for six weeks. As can be noted from Table 3 (column 11, series 2), these dentures exhibited a final dimensional change much greater than that of any of the others. It is doubtful that a one-hour processing time is sufficient for best results. According to the results shown in Tables 2 and 3, however, there is little to be gained, so far as dimensional stability is concerned, in prolonging the curing time beyond two and a half hours.

With the exception of series 2 and 7 (Table 3), all of the dentures should fit the mouth reasonably well after a six-week period of immersion in water, since the discrepancies measured at the end of this period were practically negligible (column 11).

The dentures used in series 7 (Table 3) were processed by injection packing in a special device invented for the injection of dentures constructed with polystyrene. It was thought that the packing of the mold by injection, well before any appreciable polymerization occurred, would produce a more stable denture base. It is evident from the results obtained that such is not the case, since the dimensional stability during water immersion of the dentures packed by injection is not as good as for those properly cured by compression molding. The reason for this observation is not clear, and more research is indicated on this point.

The use of acrylic teeth instead of porcelain teeth (Table 3, series 4) apparently did not affect the results in the least, since there is no appreciable difference in the results obtained in comparison to those in series 3, in which dentures with porcelain teeth were treated in an identical manner.

5. Skinner, E. W. The science of dental materials, ed. 4. Philadelphia, W. B. Saunders Co., 1954, p. 118.

Table 3 • Dimensional stability of maxillary acrylic dentures

Series	Resin no.	Curing time (hrs.)	Curing temp. °C.	Curing shrinkage (%)	Dimensional change during storage* 1 wk. (%)	2 wk. (%)	3 wk. (%)	4 wk. (%)	5 wk. (%)	6 wk. (%)
1	A	9	70	−0.42	−0.25	−0.20	−0.15	−0.12	−0.10	−0.10
2	D	1	25	−0.05	−0.03	+0.11	+0.13	+0.27	+0.28	+0.28
3	D	2.5	25	−0.14	−0.17	−0.15	−0.11	−0.05	−0.02	−0.01
4	D†	2.5	25	−0.15	−0.15	−0.14	−0.14	−0.10	−0.07	−0.05
5	D	2.5	37	−0.26	−0.23	−0.14	−0.14	−0.11	−0.11	−0.08
6	D	16	25	−0.13	−0.12	−0.01	−0.01	+0.08	+0.09	+0.09
7	D‡	16	25	−0.14	−0.11	+0.04	+0.12	+0.12	+0.16	+0.17

*Stored in water at 37° C.
†Acrylic teeth used.
‡Injection packing technic employed.

CLINICAL APPLICATIONS

An important question from a clinical standpoint is whether the observed discrepancies are of practical importance. Such a question cannot be settled by laboratory research; the answer is to be found in clinical practice. It can be stated that none of the measured discrepancies was evidenced consistently by visual observation of the fit of the denture on the cast. It should be recognized, however, that the stone cast is rigid, and the pressure in placing the denture in position may be sufficient to adapt it so that small discrepancies in fit would not be visible. Such a situation does not exist in the mouth, and the meticulous prosthetist desires to avoid all errors possible. To this extent, any measurable error is important.

Another controversial question of importance is the fit obtained with the self-curing resins, in comparison to that obtained with the heat-curing resins. According to the data presented, there is little choice between the two types of resins in this respect. The self-cured denture bases, after immersion in water for two to three weeks, were approximately as much oversize as the heat-cured bases were undersize (Table 2). In the case of the experimental dentures, both the heat-cured and the properly self-cured dentures fit equally well for all practical purposes after an immersion of two to three weeks in water.

The data demonstrate that, in general, a curing time of one hour at room temperature for the self-curing acrylic resin denture base materials is insufficient, as evidenced by a lack of dimensional stability for the one-hour cure. The curing time should be at least two and a half hours.

There is no apparent advantage in processing a self-curing resin at higher than room temperature, so far as its fit is concerned. However, the increased temperature may result in a greater strength.[6] To insure that the resin possesses adequate mechanical properties under proper conditions of processing, regardless of its type, only those materials should be used which are guaranteed to meet the American Dental Association Specification No. 12 for Denture Base Resin (Second Revision).[7]

Although it is possible that the use of acrylic teeth in heat-cured dentures may result in fewer processing strains than with porcelain teeth,[8] such is probably not the case with the self-curing resins. With the heat-curing resins, a bond is formed between the teeth and the denture base. During cooling the teeth and the denture contract uniformly.

With the self-curing resins, no union other than mechanical usually is expected, and since no appreciable thermal changes are involved, the acrylic teeth react as any foreign body (for example, porcelain) during the processing of the resin.

SUMMARY AND CONCLUSIONS

The dimensional stability of denture bases and dentures constructed of heat-curing and of self-curing acrylic resin has been studied as to the effect of processing or curing shrinkage and water immersion. According to the results obtained, the following statements can be made:

1. The curing shrinkage of the self-cured denture bases was practically negligible, whereas that of the bases constructed with the heat-curing resin was approximately a third of 1 per cent. When dentures were processed, the curing shrinkage was greater in every in-

6. Caul, H. J.; Stanford, J. W., and Serio, A. F. Properties of self-curing denture base resins. J.A.D.A. 44:295 March 1952.

7. Swaney, A. C., and others. American Dental Association specification no. 12 for denture base resin: second revision. J.A.D.A. 46:54 Jan. 1953.

8. Horton, E. Experimental investigation of internal strains in polymerised methyl methacrylate as revealed by polarised light. Brit. D.J. 86:133 March 18, 1949; 86:176 April 1, 1949.

stance, whether a heat-curing or a self-curing resin was employed.

2. When the denture bases were immersed in water at 37°C., a gradual increase in size occurred in all instances. After an immersion of six weeks, the self-cured denture bases were approximately as much oversize as the heat-cured bases were undersize. In the case of the experimental dentures, the properly processed self-cured dentures expanded very nearly to the dimensions of the cast during water immersion. The differences in dimension of the heat-cured dentures and the self-cured dentures after water immersion were not considered to be of practical significance.

3. When a self-cured denture base was allowed to remain in air, a shrinkage occurred.

4. Dentures processed with self-curing resin at 37°C. (99°F.) exhibited a greater curing shrinkage than those processed at room temperature (20° to 25°C.).

5. There was no observed effect of the curing time on the dimensional stability of the self-cured denture bases. In the case of the experimental dentures, it was found that a one hour curing time resulted in less curing shrinkage, but the dimensional stability of the dentures so processed was poor during the subsequent period of immersion in water. A processing time of longer than one hour at room temperature is recommended for dentures constructed of self-curing resin. The curing time should be at least two and a half hours.

6. Self-cured dentures processed by injection packing were not as dimensionally stable as those processed by the usual method of compression molding. This factor should be studied further.

7. The use of acrylic teeth instead of porcelain teeth in self-cured dentures did not alter the dimensional stability.

8. The measured discrepancies could not be discerned by visual observation of the fit of the dentures on their respective casts.

9. No evidence was found that possible differences in the composition of the various self-curing resins employed affected the dimensional stability of the denture base or the denture.

Social Importance of Science • Science, as its name implies, is primarily knowledge; by convention it is knowledge of a certain kind, the kind, namely, which seeks general laws connecting a number of particular facts. Gradually, however, the aspect of science as knowledge is being thrust into the background by the aspect of science as the power of manipulating nature. It is because science gives us the power of manipulating nature that it has more social importance than art. Science as the pursuit of truth is the equal, but not the superior, of art. Science as a technique, though it may have little intrinsic value, has a practical importance to which art cannot aspire. *Bertrand Russell, The Scientific Outlook, 1931.*

Histological, histochemical and other aspects of caries initiation

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The etiology of caries has been the subject of concern, speculation and investigation for over 2,000 years. Present concepts of caries etiology had their origin, for the most part, in the nineteenth century. By 1881 two distinct schools of thought as to the mechanism of caries initiation had developed. Their differences of opinion are reflected in the extremes of position taken by a number of investigators to this day.

The two schools of thought were based on the chemical and the parasitic approaches. The most vigorous supporters of the chemical theory were Robertson (1835),[1] Tomes (1859),[2] and Magitot (1867).[3] The proponents of the chemical theory suggested that caries was due to the solvent action of acids generated by the fermentation of food "in the several parts of the teeth best adapted for their reception."[1] The parasitic theory was championed by Weil (1880)[4] and Underwood and Milles (1881).[5] Weil stated:

> I regard it as quite probable that this fungus *Leptothrix buccalis* bores directly through it [enamel cuticle]. The fungi now proceed farther into the enamel and force apart its prisms, gradually breaking up its structure.

Underwood and Milles stated:

> . . . that caries is absolutely dependent upon the presence and proliferation of organisms; that these organisms attack first the organic material, and feeding upon it, create an acid which removes lime salts.

The major attempt of the nineteenth century to establish the etiology of caries is contained in the investigations and publications of W. D. Miller. In his *Micro-organisms of the Human Mouth*, Miller propounded his chemicoparasitic theory which has served as a basis for a great deal of the twentieth century research in caries etiology. In the book, which was based on extensive chemical, bacteriological and histological research, Miller defined dental decay as:[6]

> . . . a chemico-parasitical process consisting of two distinctly marked stages: decalcification, or softening of the tissue, and dissolution of the softened residue. In the case of enamel, however, the second stage is practically wanting, the decalcification of the enamel practically signifying its total destruction.

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1. Robertson, W. A practical treatise on the diseases of the teeth. London, Longman, Rees, Orme, Brown, Green and Longman, 1835.

2. Tomes, J. A system of dental surgery. London, J. and A. Churchill, 1859.

3. Magitot, E. Traite de la carie dentaire—Recherches experimentales et therapeutiques. Paris, J. B. Bailliere et Fils, 1867.

4. Miller, W. D. Micro-organisms of the human mouth. Philadelphia, S. S. White Dental Mfg. Co., 1890, p. 134.

5. Underwood, A. S., and Milles, W. F. Investigation into the effects of organisms upon the teeth and alveolar portions of the jaws. Trans., Internat. Med. Cong. 7th Session 3:523, 1881.

6. Miller, W. D. Micro-organisms of the human mouth. Philadelphia, S. S. White Dental Mfg. Co., 1890, p. 205.

Much of the recent controversy on caries etiology might have been avoided had Miller's work been read and evaluated more thoroughly, especially the part on enamel caries. In historical perspective, his work actually bridged the gap between the exclusively chemical and exclusively parasitic (proteolytic) approaches. Yet there has been a tendency to take his oversimplified definition of caries and simplify it still further to the so-called "acidogenic theory."[7] Miller's concept of enamel caries included direct bacterial action on organic tissues. He stated:[8]

> The destruction of the enamel as it occurs in decay must be regarded as essentially a parasitico-chemical process. The loosening of the enamel prisms is caused by acids concerning whose origin there can be no doubt; they arise in the mouth by fermentation of carbohydrate. . . . The bacteria directly participate in the process, inasmuch as they invade the broken-down enamel, perhaps drive the prisms farther apart and destroy the remnant of organic matter. Micro-organisms do not exert a direct influence on normal enamel; their action upon the enamel in the first stage of decay is therefore indirect,—that is, they act by means of the acids which they produce. In the latter stages of the process they exert also a direct action upon the diseased tissues.

This statement of Miller frequently has been overlooked, and his definition of caries with its reference to "decalcification of the enamel practically signifying its total destruction" has been stressed. Miller did not ignore the organic tissue in enamel (despite the lack of good histological technic for its preservation) or its role in caries. He relegated it to a secondary position in his concept of caries development.

Recent refinements in histological technics for the preservation of the enamel protein matrix have led to a revival of the proteolytic theory of caries initiation. As previously stated, the theory that caries is initiated by a direct attack on the organic matrix of enamel dates back to 1880.[4] Bodecker in 1906[9] provided the histological basis for the theory with the development of the first technic for retaining enamel matrix in decalcified section. He considered the organic matter, especially the lamellae, as the site of caries initiation. A similar view was expressed by Baumgartner[10] in 1910, Fleischmann[11] in 1921, Gottlieb[12] in 1921 and more fully in 1947,[13] Pincus[14] in 1937, and Frisbie, Nuckolls and Saunders[15] in 1944.

In essence the proteolytic theory suggests that caries is initiated by proteolytic organisms which enzymatically attack the organic matrix of enamel. The theory recently has been broadened to consider "still unknown bacterial enzymes or metabolites acting on special proteins or other organic substances as yet unidentified."[16] The role assigned to an acid component of the caries process varies with the investigator. Some have considered acid action as a secondary or accompanying phenomenon after the lesion has been initiated.[13, 15] Others state that the acid is produced *in situ*.[11] In a recent paper, Pincus[17] revived the old Underwood and Milles' (1881)[5] suggestion

7. Shaw, J. H. Modern concept of the etiology of dental caries—the acidogenic theory. Internat. D. J. 1:48 Dec. 1950.

8. Miller, W. D. Micro-organisms of the human mouth. Philadelphia, S. S. White Dental Mfg. Co., 1890, p. 170, 171.

9. Bodecker, C. F. Enamel of the teeth decalcified by the celloden decalcifying method and examined with ultra violet light. D. Rev. 20:317 April 1906.

10. Baumgartner, E. Die tierischen und anaeroben pflanzlichen Protisten der Mundhoele des Menschens. Ergebniss Zahnheilkunde II. Wiesbaden, J. F. Bermann, 1910, p. 729.

11. Fleishmann, L. Zur Pathogenese der Zahnkaries. Ztschr. f. Stomatol. 19:153, 1921.

12. Gottlieb, Bernhard. Aetilogie und Prophylaxe der Zahnkaries. Ztschr. f. Stomatol. 19:129, 1921.

13. Gottlieb, Bernhard. Dental caries: its etiology, pathology, clinical aspects and prophylaxis. Philadelphia, Lea & Febiger, 1947.

14. Pincus, Paul. Caries: attack on enamel protein in an alkaline medium. Brit. D. J. 63:511 Nov. 1, 1937.

15. Frisbie, H. E.; Nuckolls, J., and Saunders, J. B. de C. M. Distribution of organic matrix of enamel in the human tooth and its relation to histopathology of caries. J. Am. Col. Den. 11:243 Sept. 1944.

16. Hurst, Valerie, and others. In vitro studies on the initiation of enamel caries. I. Enamel penetration by oral bacteria in nonacid environment. Oral Surg., Oral Med. & Oral Path. 6:976 Aug. 1953.

17. Pincus, Paul. Production of dental caries; a new hypothesis. Brit. M. J. 2:358 Aug. 13, 1949.

that the acid is a by-product of proteolysis.

When the proteolytic theory is analyzed and compared with the Miller chemicoparasitic theory, it appears that the basic differences are of sequence and emphasis. When examined carefully, both theories consider the involvement of the organic and inorganic elements in enamel caries. The question at issue is not whether the protein matrix of enamel is destroyed, but whether its destruction by enzymatic agents is the primary change or whether it is secondary to the decalcification process.

When the evidence presented by the adherents of the concept of primary proteolytic change is reviewed, it appears that the question has not been resolved. Actually, all that has been presented to date is a histopathologic demonstration that enamel regions relatively rich in organic matter may serve as a pathway for the spread of decay. There is as yet no positive chemical or bacteriologic evidence that enamel caries is initiated by enzymatic dissolution of the organic framework. With regard to the histopathology of caries, a recent statement by Scott and Albright[18] is apropos:

> Even at this early stage in the electron microscopic examination of carious enamel and dentin, it is easy to see how the variety of structural configurations observed under the optical microscope has led to so many different conclusions. The results of the present investigation demonstrate that it is possible to obtain evidence which might be interpreted as support for almost any of the conflicting ideas on the histopathology of caries.

In studying the formation of early carious lesions in enamel, Sullivan[19] made the correlate observation that:

> . . . the phenomena observed can be interpreted in such a variety of ways that the conclusion reached will almost certainly be biased by the investigator's previous ideas concerning the structure of enamel and possible methods of its breakdown.

A valid interpretation of histopathologic sections of enamel caries can only be made when there is a complete understanding of the physical and chemical nature of the structures involved as well as an appreciation of the chemical and bacteriological aspects of the destructive processes. Obviously, at present all the necessary information is not available. A considerable amount of work, however, has been done, and it is important for the scientist to examine the evidence available to date in order to orient himself toward the solution of the problem of caries initiation.

PIGMENTATION OF THE LESION

Gottlieb[13] and Frank[20] have attributed the development of the yellowish brown discoloration frequently seen in caries to the action of proteolytic organisms on the enamel matrix. Dreizen and co-workers[21] have shown that a similar discoloration can be produced *in vitro* by the action of intermediary products of carbohydrate metabolism on decalcified noncarious tooth crowns. Similarly, when extracted caries-free teeth were exposed to pure cultures of lactobacilli in a synthetic medium containing glucose, the typical yellow-brown pigment of caries was produced by Dreizen and Spies,[22] and by Weisberger.[23] No pigmentation was produced in the absence of glucose. Although these studies in no way invalidate the possibility of proteolysis as the initiating factor in caries, they do indi-

18. Scott, D. B., and Albright, J. T. Electron microscopy of carious enamel and dentine. Oral Surg., Oral Med. & Oral Path. 7:64 Jan. 1954.

19. Sullivan, H. R. Formation of early carious lesions in dental enamel. J. D. Res. 33:218 April 1954.

20. Frank, R. Etude du développement en surface de la carie dentaire par la méthode des répliques ombrées et par une technique d'usure inversée, à la meule. Schweiz. Monatsschr. f. Zahnh. 63:683 July 1953.

21. Dreizen, S., and others. In vitro production of "yellow-brown melanin-like pigment" in the organic matrix of noncarious human tooth crowns by methylglyoxal (pyruvic aldehyde) and acetol (acetyl carbinol). J. D. Res. 28:26 Feb. 1949.

22. Dreizen, S., and Spies, T. D. Decalcification and discoloration of intact non-carious human tooth crowns. Oral Surg., Oral Med. & Oral Path. 4:388 March 1951.

23. Weisberger, David. Role of glucose in the production of artificial caries. J. D. Res. 29:14 Feb. 1950.

cate that the discoloration of the lesion may be the result of a carbohydrate degradation product rather than of proteolysis.

In a grenz ray study of early caries lesions,[24] it was noted in a number of specimens that:

> . . . the distribution of decalcification areas as seen in the grenz ray negative was comparable in degree and extent of decalcification to the degree of increased pigmentation of the enamel lesion.

In other specimens there was a lack of correlation between dark pigmented areas and their grenz ray negative.

It therefore is not possible at present to decide if pigmentation of the carious lesion is the result of the activity of proteolytic or acidogenic organisms. It has not even been positively established whether the pigmentation is the result of an actual alteration in an enamel structure or whether it is a penetration of a color-imparting material from the bacterial plaque. Studies with dyes and radioactive isotopes have demonstrated that penetration of enamel can occur, probably along organic pathways, even in the absence of caries.[25]

PROTEOLYSIS OF THE ORGANIC MATRIX

The cornerstone of the proteolytic theory as frequently stated is the destruction of the enamel matrix by extracellular enzymes produced by proteolytic organisms. Any evaluation of this process in enamel caries would have to consider the chemical, histochemical and bacteriological evidence now available rather than merely the histopathological evidence.

Chemically, it has now been established that enamel contains about 0.56 per cent organic matter of which 0.18 is a type of keratin, 0.17 per cent is a soluble protein (possibly a glycoprotein) and the remainder is citric acid and peptides.[26] Meyer[27] classifies carbohydrate-protein complexes as mucopolysaccharide (neutral or acid) considered to be in association with protein, mucoid or mucoprotein and glycoprotein; the mucoprotein contains more than 4 per cent hexosamine, the glycoprotein, less than 4 per cent.

Keratin is among the most chemically resistant proteins known, and no evidence has yet been presented of oral organisms capable of its enzymatic destruction. In the only bacteriological study available on the possible role of proteolytic organisms in human enamel caries,[28] the authors state: "We were unable to isolate organisms from early enamel caries that were able to proteolyze any of the more resistant proteins." The majority of organisms in early enamel caries were found to be acidogenic.

In an *in vitro* study Hurst and coworkers[16] demonstrated the following:

> When unerupted hamster molars were incubated in pure broth cultures of actinomycetes, lactobacilli or viridans streptococci at neutral pH values, these bacteria penetrated microscopic areas of the enamel.

If these findings could be corroborated in erupted human teeth, it would lend much strength to the proteolytic theory. At present, however, it can only be entertained as a preliminary indication that bacterial penetration of enamel can occur without prior decalcification by acid.

There is good histochemical evidence that acid mucopolysaccharide is present in the interprismatic organic matter of mature enamel.[29] Its relation to the car-

24. Gottlieb, B.; Diamond, M., and Applebaum, E. Caries problem. Am. J. Orthodont. & Oral Surg., 32: Sec. Oral Surg. 365 June 1946.

25. Leicester, H. M. Biochemistry of the teeth. St. Louis, The C. V. Mosby Co., 1949.

26. Stack, M. V. Organic constituents of enamel. J.A.D.A. 48:297 March 1954.

27. Advances in protein chemistry, vol. 2. New York, Acad. Press, Inc., 1945.

28. Burnett, G. W., and Scherp, H. W. Distribution of proteolytic and aciduric bacteria in the saliva and in the carious lesion. Oral Surg., Oral Med., & Oral Path. 4:469 April 1951.

29. Wislocki, G. B., and Sognnaes, R. F. Histochemical reactions of normal teeth. Am. J. Anat. 87:239 Sept. 1950.

ies process has been studied histochemically in deciduous teeth by Sognnaes and Wislocki.[30] Their work indicated the following:

> . . . that the metachromatic and basophilic reactions, indicating the presence of acid muco-polysaccharide . . . are among the first reactions to disappear with the onset of caries.

There is, therefore, good preliminary evidence that in deciduous teeth, at least, degradation of acid mucopolysaccharide is part of the early caries process.

A number of experiments have indicated that before tooth protein in general, and glycoprotein specifically, can be depolymerized and lysed, demineralization seems to be necessary to unmask some of the protein linkages probably bonded to the inorganic portion.[31] This feature of tooth proteolysis has been reported by Engel[31] who worked with collagenase from *Clostridium welchii*, by Evans and Prophet[32] who worked with enzymes prepared from *Clostridium histolyticum* and by Dannenberg and Bibby[33] who used trypsin. A similar demineralization seems to be an essential precursor to making the organic matrix accessible to certain organic dyes, as reported by Sognnaes and Wislocki[30] for the metachromatic staining reaction and by Burnett and Scherp[34] for the azo dye reaction.

It has been suggested that in regions of immature enamel (incomplete mineralization), the acid mucopolysaccharide, at least, may be attacked directly.[30] At present this is only speculation.

Although there has been no report of oral organisms or enzyme systems capable of attacking keratin, there is some evidence of the existence of other systems in the mouth capable of attacking less resistant proteins (or their prosthetic groups). These include demonstration of a collagenase,[35] hyaluronidase,[36] phosphatase[37] and mucolytic enzyme (mucinase).[38,39] Whether the hyaluronidase and mucolytic enzyme can affect enamel carbohydrate-protein has not been established to date. Carious dentin has been shown to possess at least two depolymerizing enzymes which resemble collagenase and hyaluronidase.[31] These enzymes are believed to be of bacterial origin. No such demonstration of depolymerizing activity has been made for enamel.

The identification of a carbohydrate-protein complex in the organic matrix of enamel seems to be stimulating investigation into the proteolytic phase of enamel caries. Because of the advances which have been made in enzyme chemistry, these investigations may prove very rewarding. The carbohydrate-proteins are far less resistant to proteolysis than keratin, are much more soluble, and their enzymatic dissolution in caries is more consistent with the present knowledge of oral enzyme systems. A positive association with the caries process, or the actual mechanisms for their destruction, however, still remains to be established.

ORGANIC STRUCTURES OF ENAMEL

The statement is frequently made, in support of a proteolytic initiation of caries, that regions rich in organic matter serve as pathways for the spread of decay. Although this may be true to some

30. Sognnaes, R. F., and Wislocki, G. Histochemical observations on enamel and dentin undergoing carious destruction. Oral Surg., Oral Med. & Oral Path. 3:1283 Oct. 1950.

31. Engel, M. B. Softening and solution of the dentin in caries. J.A.D.A. 40:284 March 1950.

32. Evans, D., and Prophet, A. Disintegration of human dentin by bacterial enzymes. Lancet. 1:290 Feb. 18, 1953.

33. Dannenberg, J. L., and Bibby, B. G. Effect of zinc chloride and potassium ferrocyanide on proteolysis. J. D. Res. 29:177 April 1950.

34. Burnett, G., and Scherp, H. W. Accessibility of the organic dentinal matrix. J. D. Res. 31:776 Dec. 1952.

35. Roth, Genevieve, and Myers, H. I. Identification of a proteolytic enzyme of the periodontal pocket. J. D. Res. 31:18 Feb. 1952.

36. Lisanti, V. F. Hyaluronidase activity in human saliva. J. D. Res. 29:392 June 1950.

37. Fitzgerald, R. J. Preliminary studies on the presence of acid phosphatase in certain oral microorganisms. J. D. Res. 31:189 April 1952.

38. Rogers, H. J. Bacterial hydrolysis and utilization of polysaccharide-like substances ("mucin") in saliva. Nature 161:815 May 1948.

39. Knox, K. W. Observations on the action of mucolytic enzymes on salivary mucoid. J. D. Res. 32:374 June 1953.

degree, a number of points must be considered.

Electron microscopy has disclosed a filamentous organic network interspersed in the calcified material both within and between the enamel prisms.[40] Measurements indicate that these fibrils are about 50 millimicrons thick. Theoretically, at least, they may be destroyed by extracellular enzymes in advance of proteolytic bacteria. But unless some destruction of the adjacent inorganic substance occurs (demineralization), there would be insufficient room for the bacteria observed in histologic section of these regions.

A similar situation exists with regard to the inorganic phase of enamel. The openings observed by electron microscopy in the meshwork of the submicroscopic fibrils within and between the prisms and assumed to contain apatite crystals, are about 200 millimicrons in diameter. Dissolution of these crystals would have to be followed by some disruption of the adjacent organic material to allow bacterial penetration.[41] This disruption may be enzymatic or it may be mechanical. Production of carbon dioxide from the decalcification could, theoretically, at least, rupture the organic fibrils. In preparation of decalcified sections of enamel for histologic examination, such destruction of the organic material is common, unless specific precautions are taken.[42]

Discoloration, thickening and bacterial penetration in the region of the prism sheaths have been offered by several investigators as evidences of initial proteolysis in caries. Although early proteolysis is certainly a possible explanation for these observations, alternate explanations have been offered. In a recent study, Sullivan[43] noted that after producing decalcification of enamel with a buffered solution at pH 4.1 to 4.5 saturated with calcium orthophosphate and then staining with alizarin red S (considered specific for free calcium), the first sign of red coloration appeared in the area of the prism sheath. He noted a similar red color in beginning enamel caries stained with alizarin red S. Normal enamel is unaffected by the alizarin. He stated, ". . . in carious lesions the organic structures of the enamel and the 'free' calcium ions seem to coexist in the same place." It is thus apparent that more than proteolysis must be considered when prism sheaths are observed in relation to caries. The physical and chemical relationship of the inorganic to the organic phase of enamel requires further elaboration before the phenomena observed in enamel caries can be explained adequately.

Much new information concerning the histological nature of the prism sheath has appeared recently. It has been noted that in normal enamel, sheaths are frequently discontinuous and often show breaks around the prism.[44] Hence in sections of enamel caries, what has been considered as proteolytic destruction of the sheath in some regions, may be normal variations in structure. It has been reported "that in some instances prism sheaths themselves appear to be made up of fine fibrils."[40] The possibility thus exists that the prism sheaths may have an inorganic phase within their own fibrillar network. Scientists are only on the threshold of understanding the structures with which they are concerned in the study of caries.

Frequent mention has been made of enamel lamellae as a pathway for the spread of decay. It has been assumed by a number of investigators that these are essentially true organic structures that can

40. Scott, D. B., and others. Electron microscopy of mature human enamel. J. D. Res. 31:74 Feb. 1952.

41. Sognnaes, R. F. Enamel as a barrier to caries. Illinois D. J. 22:422 July 1953.

42. Sognnaes, R. F. Organic elements of the enamel. Study of principal factors involved in histological preservation of organic elements of enamel and other highly calcified structures. J. D. Res. 27:609 Oct. 1948.

43. Sullivan, H. R. Formation of early carious lesions in dental enamel. II. J. D. Res. 33:231 April 1954.

44. Scott, D. B. Recent contributions in dental histology by use of the electron microscope. Internat. D. J. 4:64 Sept. 1953.

be attacked by proteolytic organisms or their enzymes, opening the way for caries of the dentin. Recent investigation of the nature of these tracts and their relation to the decay process raises some questions as to the manner of their involvement in caries.

After years of controversy there now seems to be agreement that there are probably two basic types of lamellae:[13,45-49] (1) strips of enamel matrix which have failed to calcify and (2) cracks formed preeruptively by tension during tooth development or posteruptively as a result of trauma. The strips that remained in the matrix state would still probably contain about 30 per cent calcium salts —the proportion found in the matrix before final maturation occurs.[50] Several observations have been made as to the material which fills the crack type of lamellae. The preeruptive type has been shown to contain aspirated cells from the enamel organ or surrounding connective tissue,[13,45] granular contents of ameloblasts, granular and other material from rod and inter-rod matrix in the line of the crack[49] and dental lymph.[51] The posteruptive variety has been observed to contain material from plaques and saliva.[46,49] With this variety of contents, both inorganic and organic, the labeling of a destructive process within these tracts simply as proteolysis, is not sound. Although it seems likely that some form of proteolysis occurs, other possibilities should be entertained. Lamellae may permit ready diffusion of acid formed in the plaque, or may contain calcium salts easily attacked by surface acid. Sufficient space may exist within these areas for bacteria to penetrate without any preceding destruction. Several studies have indicated that the lamellae may contain bacteria without any evidence of an actual caries process.[18,52-55]

A recent observation by Scott and Wyckoff[56] on the relation of cracks to caries is appropriate at this point. After studying surface replicas of over 300 carious lesions, they stated, "There is a chance relation between carious lesions and cracks."

The possibility that regions of immature enamel may be attacked directly by proteolytic organisms or their enzymes has been suggested.[24,30] This possibility is theoretically consistent with the present knowledge of enzyme activity on teeth, provided the organic constituent is a carbohydrate-protein complex rather than keratin. Information on the nature, amount and distribution of immature enamel, however, is as yet rather sparse.

DECALCIFICATION

The bulk of research during the last 50 years on the etiology of caries has been concerned with various aspects of decalcification. There seems little doubt that demineralization is an essential aspect of the caries process. The means of clinical diagnosis, both physical and roentgenographic, are based on this alteration in structure. Despite the monumental literature and clinical experience, positive

45. Orban, B. Oral histology and embryology. St. Louis, The C. V. Mosby Co., 1944.

46. Sognnaes, R. F. Organic elements of the enamel. IV. Gross morphology and histological relationship of the lamellae to organic framework of enamel. J. D. Res. 29:260 June 1950.

47. Bodecker, C. F., in consultation with Gottlieb and others. Enamel lamellae. Oral Surg., Oral Med. & Oral Path. 4:787 June 1951.

48. Scott, D. B. Microscopic studies of dental tissues. II. Optical microscopy of tooth surfaces. Oral Surg., Oral Med. & Oral Path. 5:638 June 1952.

49. Hodson, J. J. Investigation into the microscopic structure of common forms of enamel lamellae. II. Lamellae in erupted teeth with special reference to the form and contents of the classical type. Oral Surg., Oral Med. & Oral Path. 6:495 April 1953.

50. Weinmann, J. P.; Wessinger, G. D., and Reed, G. Correlation of chemical and histological investigations on developing enamel. J. D. Res. 21:171 April 1942.

51. Bodecker, C. F. Enamel lamellae and their origin. J. D. Res. 32:239 April 1953.

52. Arnim, S. S. Histopathology of dental caries in the Rhesus monkey. (Abst.) J. D. Res. 32:635 Oct. 1953.

53. Hodson, J. J. Structure and histogenesis of certain wedge and other shaped defects in the surface of human enamel, with a note on their relation to the carious process. Brit. D. J. 94:141 March 17, 1953.

54. Atkinson, H. F., and Prophet, A. S. Production of artificial lamellae in human enamel. Brit. D. J. 95:60 Aug. 4, 1953.

55. Morris, E. O. Bacteriology of the oral cavity. Brit. D. J. 95:77 Aug. 18, 1953.

56. Scott, D. B., and Wyckoff, R. W. G. Studies of tooth surface structures by optical and electron microscopy. J.A.D.A. 39:275 Sept. 1949.

proof that decalcification is the initial phenomenon in caries is still lacking. Prophylactic measures based on interference with the decalcification process in one way or another have only been partly successful in preventing new decay.

Although there has been as yet no incontestable demonstration that decalcification is the initial process in caries, it does not follow that proteolysis is the main factor. In fact, much of the work on proteolysis indicates that an acid component is necessary as a precursor or accompanying factor. In a recent paper, Nuckolls and others[57] stated:

> Recent work appears to indicate that simultaneous decalcification and degradation of enamel matrix are essential to the development of caries. This idea seems to fit in better with what is known of micro-organisms than either extreme position.

In considering the role of acids in beginning caries, it is important to differentiate between *in vivo* decalcification and the application of strong acids to enamel *in vitro*. That strong acid in a test tube results in complete dissolution of the inorganic salts, explosive disruption of the organic matrix, rapid loss of surface continuity and considerable cupping or cavitation is not a valid criticism of decalcification as the initial factor in caries. In caries, acid production is rather low grade (pH 4.5 to 5.5), intermittent and confined to specific sites, and it occurs in a medium which has a relatively high concentration of calcium and phosphate ions. The enamel is subjected to numerous attacks by relatively weak organic acids over long periods of time.[58] The inorganic portion of enamel is composed of a number of different substances which may include hydroxyapatite, carbonate apatite and fluorapatite, hydrated tricalcium phosphate and calcium carbonate, each having markedly different solubilities in weak organic acids.[25, 59-63] There may occur, therefore, in beginning caries a selective decalcification producing numerous minute surface discontinuities though still retaining the gross appearance of an intact outer layer. Replica studies of beginning caries lesions[64] as well as careful *in vitro* decalcification studies [43, 65] appear to support this contention.

It has also been suggested by a number of investigators that protein substances may enter the partially demineralized enamel from the plaque and help maintain enamel integrity and prevent gross cavitation, at least in the early stages of caries.[62, 66-68] Decalcification or erosion similar to that seen in test tube experiments frequently can be observed in the mouth. It is easily differentiated from true caries. Development of this type of lesion, rather than true caries, may be due to differences in local conditions, differences in the nature and composition of the plaque,[58] or a complete absence of a direct bacterial (parasitic) phase.

It is important to make a distinction between decalcification as the initiating phase in enamel caries, and decalcification as the entire process. As pointed out previously, considerable controversy has arisen because critics of the chemico-par-

57. Nuckolls, J., and others. Some recent studies concerned with fundamental research on beginning caries. J.A.D.A. 44:529 May 1952.

58. Fosdick, L. S. Theoretical considerations of certain phases of the caries problem. Northwest. Univ. Bul. 49:4 Nov. 1949.

59. Dallemagne, M. J., and Melon, J. La localisation de l'apatite et du phosphate tricalcique dans l'émail dentaire. Arch. biol., Paris 57:79. 1946.

60. Gore, J. T. Saliva and enamel decalcification. IV. Factors involved in prevention of caries. J. D. Res. 19:455 Oct. 1940.

61. Gore, J. T. Role of calcium carbonate in dental caries. J.A.D.A. 47:180 Aug. 1953.

62. Hardwick, J. L., and Manley, E. B. Caries of the enamel. II. Acidogenic caries. Brit. D. J. 92:225 May 6 1952.

63. Posner, A. S., and Stephenson, S. R. Isomorphous substitution in enamel apatite. J.A.D.A. 46:257 March 1953.

64. Scott, D. B.; Kaplan, H., and Wyckoff, R. W. G. Replica studies of changes in tooth surfaces with age. J. D. Res. 28:31 Feb. 1949.

65. Basic, F. C. Caries-like enamel changes by chemical means. (Abst.) J. D. Res. 32:637 Oct. 1953.

66. Boust, T. B. Micro-organisms and caries. J.A.D.A. 17:1536 Aug. 1930.

67. Bibby, B. G. Neglected factors in study of dental caries. J.A.D.A. 22:222 Feb. 1935.

68. Enright, J. J.; Friesell, H. E., and Trescher, M. O. Studies of the cause and nature of dental caries. J. D. Res. 12:759 May 1932.

asitic theory have made such statements as:[69]

> The popularly accepted concept of dental caries, namely, that acid formation on the surface of the tooth is the complete cause of its destruction, has been followed for more than half a century.

It is true that since the work of W. D. Miller the emphasis has been on acid, but the acid has been considered as the initiating agent, not the source of complete destruction. Miller considered destruction of the organic portion of enamel in caries, but he relegated it to a minor role. Many of our present investigators consider the proteolytic phase in the same light. The Michigan Workshop definition of caries[70] is apropos:

> Dental caries is a disease of the calcified tissues of the teeth. It is caused by acids resulting from the action of micro-organisms on carbohydrates, is characterized by a decalcification of the inorganic portion and is accompanied or followed by a disintegration of the organic substance of the tooth.

The argument thus becomes one of semantics as well as one of emphasis and sequence. Stressing the inorganic phase does not preclude a consideration of a destructive process in the organic portion. Whether the emphasis is warranted is another matter and may be open to debate. Alternative explanations for observed phenomena will continue to be advanced until enough evidence has accumulated to settle the matter.

SUMMARY

The application of many new research technics to the problem of dental caries has brought scientists considerably closer to a full understanding of the mechanism of caries initiation and the etiology of tooth decay. Recent additions to the knowledge of the chemical and histological nature of tooth components have enhanced scientists' ability to interpret phenomena long observed. Alternative explanations are still possible, however, and further research is required before the problem can be resolved.

Notwithstanding arguments over semantics, it seems apparent that both decalcification and proteolysis are essential parts of the caries mechanism in enamel as well as dentin. Demonstration of a carbohydrate group possibly in association with protein in enamel matrix has made reconciliation between the histological interpretation and the chemical nature of caries much more of a possibility. The positive association of carbohydrate-protein with the caries process and the actual mechanism for its destruction, however, still remains to be established. No chemical or bacterial evidence has been presented to date to account for the degradation of the keratin fraction.

The evidence for association of acid and demineralization with enamel caries is considerable. Physical changes, grenz ray and roentgenographic examination attest to a loss of calcified material. The ability to section undecalcified areas of enamel caries for electron microscope study and to observe in these sections many areas of intact enamel matrix, supports the implication of external acids in enamel caries. Speculation that the acid could be a by-product of proteolysis hardly seems tenable in light of the minute amount of protein matrix present and the substantial amount of inorganic material destroyed. The monumental literature on the association with the caries process of acidogenic organisms, bacterial plaque, carbohydrate and local factors of food impaction and retention leaves little doubt that the source of acid is external.

Despite the substantial body of evidence relating acid to caries, an incontestable demonstration of its role in the actual initiation of caries is still not avail-

69. National Academy of Sciences—National Research Council. Survey of the literature of dental caries. Publication 225. Washington, Academy, 1952.

70. Easlick, K. A. Dental caries. St. Louis, The C. V. Mosby Co., 1948.

able. Histological observations are still subject to alternative explanations. Studies have indicated that acid formation might be concerned indirectly with pigmentation of the lesion and that decalcification might be a necessary precursor to depolymerization and lysis of the organic matrix. Careful *in vitro* decalcification has produced many of the phenomena observed in beginning caries. Beginning carious lesions stained with alizarin red S and lesions produced *in vitro* by acid and subsequently stained with alizarin red S have been shown to be very similar. In bacterial examination of early caries lesions, the majority of organisms were found to be acidogenic. The cumulative evidence to date is strongly indicative that acid is the initiating factor in enamel caries.

Much of the difficulty in arriving at positive conclusions as to the mechanism of caries initiation is due to the present inability to study very early lesions completely. Neither decalcified nor ground sections permit study of all the essential components. Direct sectioning of carious material is possible only after demineralization has proceeded to a substantial degree.

Scott and Albright have suggested that investigation of changes on the enamel surface by replica technic would be a promising approach. It would seem that study of the very earliest manifestations of structural alteration is necessary to establish the mechanism of caries initiation. A full appreciation of this process would aid substantially in an understanding of the complete etiology of the disease and provide a rational basis for prevention.

The dental profession in Korea

Hansoo Rhee, D.D.S., Seoul, Korea

Dentistry in Korea today lags about 50 years behind the stage reached by the dental profession in the rest of the world. Among the many reasons responsible for the backward status of the dental profession in Korea are the following: (1) lack of government aid; (2) lack of finances to support study at dental schools abroad; (3) preference among students to study politics, law and literature rather than science; (4) ignorance of oral hygiene by more than 95 per cent of population and (5) lack of a program to popularize oral hygiene.

COLLEGE OF DENTISTRY

The one dental college in Korea is the Dental College of Seoul National University. Founded in April 1922, the college was originally administered chiefly by the Japanese and enrolled a large number of Japanese students. After the liberation of Korea on August 15, 1945, responsibility for maintenance of the col-

Dental clinic, Kyungjun Hospital, Susomun-dong, Sodaemun-ku, and member, diplomatic department, Korean Dental Association.

Table • Total number of hours per subject in the Dental College

Freshman

Subject	Hours
Korean language	64
English language	128
German language	96
Chemistry	64
Anatomy	320
Histology	246
Physiology	192
Biochemistry	64
Military training	64
History of medical science	64
General zoology	64
Physical education	64
Total	1,430

Junior

Subject	Hours
Parodontia	64
Oral surgery	192
Dental prosthesis	246
Crown and bridge	246
Dental therapeutics	128
Dental filling	64
Oral hygiene	32
Dental pharmacology	64
Orthodontics	64
General clinic	64
Internal medicine	64
Otorhinology	64
Military training	64
Total	1,356

Sophomore

Korean language	64
English language	64
Pharmacology	128
Pathology	192
Bacteriology	128
Hygiene	128
Dental morphology	64
Dental histology	64
Oral pathology	128
Diagnosis	128
Surgery	64
Dental material	64
Military training	64
Total	1,280

Senior

Dental surgical anatomy	16
Pharmaceutics	32
Prosthetic dentistry	64
Dental therapeutics	64
Oral surgery	64
Radiology	32
Nutrition	32
Medical law	16
General clinic	960
Total	1,280

Clinic

Dental prosthesis

Subject	Cases
Crown	6
Pivot crown	3
Bridgework	5
Full denture	3
Partial denture	5

Oral surgery

Subject	Cases
Extraction	80
Incision	10
Operation	3
X-ray	40

Dental therapeutics

Subject	Cases
Scaling	40
Extirpation	15
Root canal filling	15
Pyorrhea treatment	10
Amalgam filling	40
Silicate cement filling	30
Inlay	25
Cement base	50

lege was assumed by Park Myung Jin, the present dean. In 1946 Seoul National University was reorganized, and the college became a part of the university.

Up to 1945, 973 Japanese students had graduated from the college. The total number of Korean graduates from 1922 to 1953 was 790. At the time of the Communist invasion of South Korea in June 1950, the college had a staff of 50 teachers and 400 students. Many teachers and students were called up for mili-

tary service. At present the college has 20 teachers and 398 students.

Students who have completed a three year course at senior high school are eligible for admission to the college. The college has a four year course of study leading to a graduation certificate provided the student passes the state dental examination. During the first and second years, students attend lectures on the fundamentals of medical and dental science. In the third and fourth year classes, clinical theory and practical work in the clinic comprise the curriculum (see table). Students are required to have 180 credit hours in various subjects, including 134 credit hours of experimentation and laboratory work, in the four year course. Of the total 180 credit hours, 30 to 40 credits must be achieved in cultural subjects; the remainder are obtained by work in the particular subjects necessary for graduation.

From its foundation, the college adopted the system of dental education practiced in the United States. During the war between the United States and Japan, contacts with the United States were broken off, and both students and faculty were unable to keep abreast of current experimentation and research. Since 1945, relations with the dental profession in the United States have been resumed, much to the benefit of Korean dentistry.

Nevertheless, much remains to be done. South Korea, with a population of approximately 20,000,000, has only one dental college. The present inadequate number of dentists cannot begin to meet the dental needs of the people.

NUMBER AND INCOME OF DENTISTS

There are an estimated 800 dentists in Korea today, compared with 8,000 medical doctors.

The number of dental clinic patients is very small compared with the number of patients visiting surgical clinics, chiefly because of the fact that the overwhelming majority of the population remains unaware of the importance of good oral hygiene. The failure to appreciate the nature and quality of dental treatment is reflected in the extremely low scale of charges for dental work. For instance, the average charge for extracting a tooth is equivalent to the price of admission to a theater. An amalgam filling costs the patient the equivalent of five packs of the best cigarettes; scaling costs the equivalent of four packs of cigarettes.

Consequently, the average dentist has an income about a fourth of that received by a surgeon. The unhappy situation of the Korean dentist is based on the people's unawareness of the importance of oral hygiene and the slowness of the dental profession in fulfilling its professional responsibilities in advancing the national welfare. What is needed above all today is a campaign to educate the people as to the importance of oral hygiene. Dentists in the United States can help in this work by providing reference books and educational material, and by their professional advice.

Mastering a Science • No one can be really master of any science unless he studies its special history, which again is bound up with the general history of humanity. *A. Comte.*

PORCELAIN JACKET CROWN PREPARATION WITH GUIDED DIAMOND INSTRUMENTS

By Siegfried Gruenwald, D.D.S., Memphis, Tenn.

With the aid of the high speed dental engine and the wide assortment of diamond stones, jacket crown preparation is no longer a time-consuming procedure. In fact, it does not require any more time than the average inlay preparation.

Since uniform thickness is one of the prime requisites of the jacket crown, it is essential that sufficient tooth structure be removed. First, the shoulder must be precisely established; second, the enamel on the labial and lingual surfaces must be reduced sufficiently. This procedure accurately carried out will give a porcelain jacket crown of uniform thickness which insures better strength and color.

This article explains the step-by-step procedure in the cross reduction of the tooth structure to the depth of the guided shoulder stone.

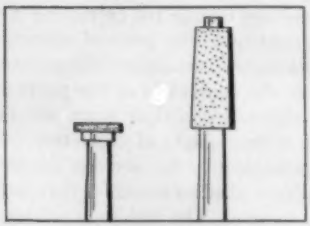

Fig. 1 • A guided shoulder stone and a guided labial and lingual reduction stone are used in preparation of the crown.

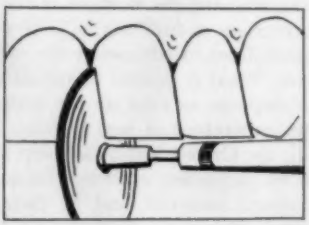

Fig. 2 • The mesial and distal shoulders for the crown are started about 1.5 mm. from the proximo-incisal angle with the disk slightly inclined toward the axial midline.

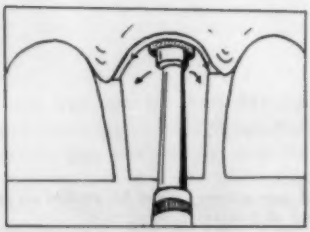

Fig. 3 • The mesial and distal slices are connected with the guided shoulder stone which in cutting follows the outline of the gingiva as closely as possible. This procedure is followed on both the labial and lingual surfaces.

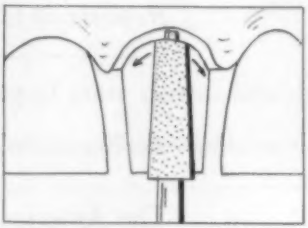

Fig. 4 • The lingual and labial reduction is accomplished with the guided reduction stone by moving the stone from the mesial to the distal aspect parallel to the long axis of the tooth. The guide pin follows the outline of the gingiva, thus assuring a uniform removal of tooth structure.

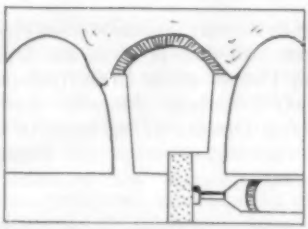

Fig. 5 • A diamond wheel is used to reduce the incisal edge. The angle is cut so that the incisal bevel will be at a right angle to the masticatory force of the opposing teeth. The removal of sharp line angles and the slight extension of the shoulder beneath the movable gingiva can be accomplished with an end cutting bur, sandpaper disks or hand instruments, whichever is the operator's favorite.

1301 Sterick Building

Protecting the Public Health • Primitive man fulfilled his simple wants by sharing in such bounty as nature placed before him. His choice was limited—by climate, terrain, or accessibility. He used from his environment what he could adapt most readily to his need.

As a guide he had only the stern process of trial and error. He ate what seemed edible. He clothed himself in what seemed appropriate to his warmth, comfort or modesty. His mistakes were numerous and often catastrophic. How many sacrifices were required to teach us that water must remain undefiled? How many died of eating the mushroom *Amanita verna* before we realized that some of nature's fruits are bitter but nutritious; others tasty but treacherously deadly? How many thatched their huts with poisonous vines or contaminated their skins with toxic materials before the slow accumulation of man's experience fixed firmer guideposts?

Today our needs are complex. Our choices are wide and grow ever wider under the inventive hand of our people. As consumer and producer, we are concerned with new materials, new methods, following one another in bewildering succession.

These new developments add much to our way of living, to our enjoyment and our convenience. Yet, it is true that as we probe further and further into the unknown for new miracles, we find also new perils and new hazards. Further, we now set values on human life, on health, and even on comfort far beyond those of past centuries.

Public protection thus becomes a primary duty and obligation. In so complex a society, it is a complex problem. Laws are passed and codes and regulations are established. Yet our laws can only proscribe obvious abuses and provide the machinery to punish wrong-doers. In an industrial civilization we rely most upon the reputation and the high technical qualification of those who make and process the familiar articles of commerce. Our strongest reassurance is the integrity of our institutions. *Foreword, Protecting the Public Health. E. I. du Pont de Nemours and Company, Wilmington, Del., 1954.*

BUREAU OF LIBRARY AND INDEXING SERVICE

The American Dental Association Film Library

The 96th Annual Session Motion Picture Program will take place in the Motion Picture Theater at the Civic Auditorium in San Francisco, Monday through Thursday, October 17-20, from 10 A.M. to 5 P.M. daily, except on Thursday when the program will terminate at 3 P.M.

Mimeographed copies of the program with detailed information on the forty-three films being shown will be available at no charge to those attending the showings. Any readers who may be interested in suitable material for dental societies, study clubs, staff training, and for public education can also obtain copies by writing to the American Dental Association Film Library, 222 E. Superior St., Chicago 11.

The films which have been selected primarily for their interest to the general practitioner are arranged in groups according to subjects such as civil defense, anesthesia, endodontics, crown and bridge, dentistry for children, orthodontics, periodontics, oral pathology, full mouth reconstruction, dental health and television.

Twenty which were produced in 1955 will have their première showing. The program has been designed to relate to the subjects being discussed on the essay and panel programs. To accommodate those members who may be occupied with dental meetings, certain films appearing earlier in the program are being repeated later in the week. The daily schedules will be adhered to, barring unforeseen circumstances. Any changes will be noted in the *Daily Bulletin* published by the Bureau of Public Information.

Of the total number of films appearing on the program six are silent, five have magnetic sound tracks and the balance have optical sound (the conventional sound tracks). The producers or their duly authorized representatives, will be present to give the commentary on all silent films. Brief discussion periods have been allotted after each film showing.

It is interesting to note that more dental schools are producing films which compare favorably in technical quality and continuity with those commercially produced than in previous years. Dentists produced fifteen; dental schools, thirteen; dental supply companies, two; the American Dental Association in cooperation with the National Bureau of Standards, two, and government agencies, eleven.

Twelve films are available on rental ($2.50) from the Association Film Library. The others may be rented from their producers whose addresses are noted on the mimeographed copies of the program.

Since the deadline for submission of films for inclusion on the program was July 15th, readers who may have completed films after that date are invited to submit their films for preview so that they may be considered for showing at the 97th annual session program. Film preview applications may be obtained from the Film Library.

COUNCIL ON DENTAL HEALTH

Content and financing of state dental health programs: introduction to symposium

David W. Brock, D.D.S., St. Louis, Mo.

Each year, the Council on Dental Health of the American Dental Association selects an important dental health subject for a national dental health conference preceding the annual session of the Association. Fluoridation, community programs, prepayment and postpayment plans and occupational dental health programs have been considered. Last year's conference was concerned with the content and financing of state dental health programs—the cornerstone for success in community-centered efforts to improve the dental health of the public.

Following the conference, the House of Delegates considered and adopted a resolution urging constituent dental societies to strengthen the dental health programs in their states through the attainment of three objectives: (1) the appropriation of state funds earmarked for dental health purposes, (2) the appointment of a capable dental director and (3) the establishment of a sound administrative position for the state dental unit.

If these objectives are to be accomplished and if the dental profession's recommendations for the improvement of the nation's dental health are to be followed, dentistry must give strong and enlightened leadership.

Symposium presented at the Fifth National Dental Health Conference sponsored by the Council on Dental Health, American Dental Association, Miami, Fla., November 6, 1954.

Chairman, Council on Dental Health, American Dental Association.

DETERMINING THE CONTENT OF A STATE DENTAL HEALTH PROGRAM

Donald J. Galagan, D.D.S., M.P.H., Washington, D. C.

Dental public health programs usually consist of four major work areas: education, prevention, correction and research. There is no standard prescription for establishing the shape or character of a state dental health program, nor for deciding which of the foregoing areas of activity should be given primary emphasis. The program content must be determined on the basis of an objective evaluation of the problems, needs and resources available within each state.

It is important first to define the epidemiological aspects of the several dental diseases and conditions within the state and their popularly understood character. After tabulation and analysis of these data, certain of the dental health problems may then be selected for concentrated effort. To identify and estab-

Assistant chief, Division of Dental Public Health, U. S. Public Health Service.

lish a priority rating for the more important dental health problems, the following criteria may be used:

1. Is the condition a biological problem detrimental to mental or physical well-being?
2. Does the condition create an economic burden?
3. Is the condition common to the whole state or does it occur only in isolated areas or to a few people?
4. Do people generally recognize this condition as a public health problem?
5. Do people feel strongly enough about it to want to do something about it?
6. Do professional groups and legislative bodies see the condition as a real problem?

After the problems are defined, those requiring concentrated attack must be selected by the state program director. The following criteria may be helpful in selecting procedures to eliminate or alleviate these problems:

1. Has the procedure been adequately tested so that beneficial results have been demonstrated scientifically?
2. Can the procedure be administered on a group or public health basis?
3. Are there sufficient resources available to apply the procedure?
4. Is the cost per unit realistic in relation to the results achieved?
5. Is the procedure acceptable to the general population?
6. Is the procedure acceptable to the professional groups involved?

The next step is to establish specific objectives in relation to both the scope of the problem and the availability of resources, both professional and fiscal. At the same time, evaluation machinery must be established. It is important to determine the level of dental ailments at the start of the program, but it is just as important to establish beforehand the methodology for determining change.

The foregoing steps—definition of problem, analysis of available procedures, establishment of objectives and provision for evaluation—constitute a mechanism for effective program determination. In these days of limited and even diminishing public health budgets, it is imperative to achieve precise program planning.

FINANCIAL SUPPORT FOR THE STATE DENTAL PROGRAM

Carl L. Sebelius, D.D.S., M.P.H., Nashville, Tenn.

The purpose of the discussion that follows is to review the reasons why financial aid was obtained for the state dental program and how the Tennessee State Dental Association obtained the funds.

In Tennessee, it was fortunate that an effort for earmarked funds and division status for dentistry came at an appropriate time, a time when there was a minimum of objections for a separate appropriation and when all groups involved demonstrated their wish for teamwork. It would not have been possible if groups, such as the health officials, the dental profession, the legislative body and the governor, had not given their support to this worthy endeavor.

The dentists of Tennessee have become more interested in dental public health activities since they have become more involved and, therefore, more acquainted with the dental public health activities in Tennessee, the enormous dental health problem, the importance of water fluoridation, and since they have had an op-

Director, Division of Dental Health, State of Tennessee Department of Public Health.

portunity to participate in the dental health workshop program and to attend the annual postgraduate dental seminar.

The obtaining of state funds for the operation of a dental health program is going to be a must if there is to be an expansion of dental health programs in the United States. There is a trend toward an effort to obtain grant-in-aid funds from Congress as evidenced recently by the indicated efforts of the American Dental Association's Council on Legislation. Certainly, every state dental director will agree that he would like to have sufficient state funds for matching purposes.

The definition of dental public health as found in the articles of incorporation of the American Board of Dental Public Health is simply stated as "the science and art of preventing and controlling dental diseases and promoting dental health through organized community efforts." It seems important that this meaning of dental public health be kept in mind.

WHY STATE FUNDS WERE OBTAINED

Doyle J. Smith, D.D.S., Memphis, Tenn.

During a two-year period, members of the Dental Service of the Tennessee Department of Public Health inspected 12,000 children, aged six to eight years, in various schools of 40 Tennessee counties. These inspections showed that there were more than six dental defects per child and that more than 89 per cent of the children were in need of some type of dental health care. A further survey indicated that the DMF rate per child increased from 1.1 in the six-year-olds to 9.5 in the 14-year-olds. If the trend in the DMF rate continued, no program could begin to meet the needs. A preventive program was mandatory.

In Tennessee, the ratio is one dentist to 2,662 people. Of the 95 counties in the state, 80 counties have a dentist-population ratio that is less than the average for the state; eight counties in the state have no dentist. The ratio range is from 1 dentist to 1,593 persons to 1 dentist to 17,800 persons. These ratios are based on all dentists, including those who have retired.

Dentists graduated from the University of Tennessee College of Dentistry are unable to practice for a period of three months prior to taking the State Board examinations. The dentists of Tennessee sought a way to utilize at least part of this available unused professional manpower. There was a need for an extern program to orient recent graduates in public health and community planning, and at the same time, provide a means of direct service to the people of the state. A change in the dental practice act in Tennessee was needed so that an official agency might employ a dentist without a license for a short period of time.

There is a need for expansion of dental health education programs directed not only to the child population but to lay and school groups, parents, public health workers and, more important, to the dentist. There was and is a need for printed and audio-visual educational materials which are factual, attractive and acceptable. It takes money to produce such materials and informed individuals to use them.

There is a need in any state for a lactobacillus diagnostic service supplied to the

Chairman, Workshop Committee, Tennessee State Dental Association.

dentists by the state health department. If the service is provided and the dentist educated to use it, there is a chance for utilization by all the dentists.

Additional information is needed in research. Such studies as the prevalence of malocclusion, prevalence of gingival and periodontal diseases, obstacles to the individual's obtaining of dental health care and an evaluation of the most effective use of dental health educators are only a few of the areas that should be studied. Data which pertain to a specific geographical area—state, county or city —are the type of information needed by the dental profession.

The need for dental health care for the indigent has been met in the past by local dentists working on an hourly fee basis. The program is a cooperative one with one half the cost paid by the local community and the other half by the state. The cooperative dental program was in danger of being seriously curtailed because of a shortage of state funds.

Any program which has the scope of that suggested by the state's dental health care needs must have additional administrative coverage. Members of the Tennessee State Dental Association were of the opinion that dentistry should be on the same level, administratively and salary-wise, as other programs of medicine.

The dental service in Tennessee formerly operated on money secured from any possible agency. There was $8,000 of state money in the budget, and the additional money was obtained, when possible, from federal money coming to the health department. The situation was such that, at times, the dental service operated from one quarter to the next, not knowing how much it could spend nor whether there would be funds available for any program. Not only was the need for additional money recognized but for a definite amount of money over a definite period of time to be used solely for dental purposes.

No agency was better equipped to study the ways and means of providing adequate dental health care than the Tennessee State Dental Association. In 1949, the T.S.D.A. initiated a series of annual workshops to study the dental needs of the communities throughout the state. The workshops are financed completely by the dental association.

If the workshop program has done nothing more than make the practicing dentists realize that they are a part of a health team, it has been a success. The dentists learned through their experiences that it would be impossible for the present dental manpower to satisfy all of the unmet needs of the community and that it was time to seek help through the appropriation of state funds.

HOW STATE FUNDS WERE OBTAINED

James J. Vaughn, D.D.S., Nashville, Tenn.

With the endorsement of Governor Frank G. Clement, the 1953 Tennessee Legislature appropriated $300,000 for the state's dental health program. Tennessee thereby became the first and only state to receive state aid for such a program, and one of the first to create a Division of Dental Health in the State Health Department.

As far back as May 10, 1950, W. B. Brooks, then president of the Tennessee State Dental Association, recommended that adequate state and local provisions should be made for the support of a basic dental health program in Tennessee—a

Chairman, Legislative Committee, Tennessee State Dental Association.

program that was sufficiently important to justify a division status within the Department of Public Health. His recommendation was given T.S.D.A. approval unanimously.

A subsequent recommendation by Oren A. Oliver some two years later at a meeting of the Tennessee Public Health Council marked the beginning of a planned program to obtain state funds for dental health services. The curtailment of federal funds was being discussed, and Dr. Oliver, chairman of the Council, suggested that:

> Dentists might well assume their responsibility of recommending to the next general assembly that funds be earmarked for dental health services so that the dental division, when established, could stand on its own feet and not be entirely dependent upon federal appropriations to carry on the work.

The T.S.D.A. president, Harry M. Underwood, sent to every member of the association a letter listing the state dental director's specific reasons for the need for an expanded program. The T.S.D.A. legislative committee sent a letter to all members of the legislative and contract committees and presidents and secretaries of all district societies asking for their active support in obtaining earmarked funds for dentistry. Dentists were requested to appear before legislative groups or councils, while each legislator's dentist was asked to talk with him personally about the need for such an appropriation.

"Challenges Facing Dental Health Today" was selected by the T.S.D.A. committees of workshop, public relations, dental health and legislation for the Fifth Annual Dental Health Workshop to be held on January 17, 1953, just prior to the convening of the legislature. The proposed budget of the Tennessee Department of Public Health included an appropriation for dentistry. Members of the workshop endorsed the dental appropriation as did the T.S.D.A. executive council, and general publicity to this effect was presented to the people of Tennessee through newspaper releases. Prior to these endorsements, Governor Clement had assured the dentists of his support for the appropriation. On many occasions since, the governor has listed the promotion of dental health as one of his major accomplishments.

It is important to bring out the fact that throughout the complete planning period, the members of the legislative committee and members of the Tennessee State Dental Association worked closely with the commissioner of public health and with the state dental director.

Dentistry in the organization of public health in Tennessee now has major divisional status, with both medical and dental personnel having equal rank. The dentists of Tennessee feel that the funds obtained have been well spent, and that through such a joint program of dental public health they can provide more and better dentistry.

ROLE OF THE DENTIST ON STATE AND LOCAL BOARDS OF HEALTH

Oren A. Oliver, D.D.S., L.L.D., Nashville, Tenn.

The role of the dentist as a member of a health board, either at the state or local level, should be considered an obligation and an opportunity to serve the profession as well as the public.

Dentists on boards of health need to be energetic opportunists, good thinkers

Chairman, Public Health Council, State of Tennessee Department of Public Health; chairman, Council on International Relations, American Dental Association.

and be interested in all phases of health. One way they can serve the profession is by reporting all general actions of the board to the profession. The members of the dental association should be kept informed of all activities by dentists on a state board of health.

The dental member should see that dentistry has its rightful place in the organization of the state health department. Dentistry should have acknowledgment and rank according to the activities carried on by the division. If a state department of public health is just entering the field of dental public health, it would be as hard to justify division status for the dental profession as it would be to justify such status for other beginning public health services. In spite of this difficulty, however, the administrative problems in the dental field should always be handled by dental personnel.

In all cases where the dental officer has training and responsibility comparable to that of the medical administrators, the dental officer should have rank and pay equal to that of the medical administrators, and it is the duty of the dental member on the board to have interest enough to assist in obtaining this recognition. It is imperative, however, that dental personnel have graduate training in public health; otherwise, they cannot be expected to be able to compete with medical administrators who have had such training. In Tennessee, six dentists now have Master of Public Health degrees, and it is felt that such training is one of the secrets of the accomplishments for dentistry in that state.

The dental member can also be helpful in seeing that dentistry is represented on advisory councils, such as hospital licensing and hospital advisory boards. In Tennessee, the chairman of the Public Health Council serves as secretary to the Hospital Advisory Board.

The dental member should be aggressive in his stand for a policy on water fluoridation. It really does not make sense to have the efforts of the dental director counteracted by contrary statements made by another member of the state health department.

The dentist members of local boards of health do much to serve the community in the capacity of dental health advisers as well as good citizens. There are many instances where the dental member of the county board of health has been a real community leader. He may be the spokesman for an increased county appropriation that may be instrumental in the promotion of a health center with dental facilities; he may assist in personnel matters and fund raising so that salary increases can be made, and he may participate in numerous other activities.

The director of Local Health Service in Tennessee has cited many instances in which the dental member has served well on the local board of health. Recently, a dentist in one county wished an increased appropriation for some essential health services, even though the county was presently providing a 10 cent levy. He appeared for the board before the members of the county court and obtained a levy of approximately 15 cents. Another dentist is given credit for obtaining funds for a health center with dental facilities; another dentist became interested in sanitary regulations and spearheaded a successful drive to revise the sanitary regulations in the county; another dentist has seen to it that each year the dentists of the community assume the responsibility of a dental examination program for all children of the city schools. These activities are only a few of the many engaged in by dental members on boards of health. The workshop program has done much to create an interest in community activities.

The profession of dentistry gains, as does the community, when a dentist becomes an active member of a board of health, attends all the meetings and takes his responsibility seriously.

PROPER ADMINISTRATIVE STATUS FOR THE DENTAL HEALTH UNIT IN A STATE HEALTH DEPARTMENT

Lloyd H. Dodd, D.D.S., Decatur, Ill.

The achievement of proper administrative status for the dental health unit in a state health department is no more and no less difficult and complex than the achievement of status for any other administrative unit in the public health field. The foundation stone on which the organizational structure must be built is program. Equally basic and essential are the people concerned and involved in the enterprise.

With respect to program as related to a dental administrative unit, it is not enough to announce and proclaim that bad teeth are a universal plague and something ought to be done about it. Everybody knows that. It is not enough to tell people to keep their teeth clean and to visit their dentists regularly. Everybody knows that, too.

Since the need is for a program that yields practical results which can be seen and appreciated, the dental public health program is usually limited to children. For example, two important activities that yield practical results and that are appreciated by the community are bitewing roentgenographic surveys and, in communities where the water supply is fluoride-deficient, topical applications of fluoride.

The successful community program must not only embrace activities of a practical character but must permit participation on the part of all children in the community. Consequently, a part of the responsibility of the people at the community level is to find ways to finance needed dental treatment for the children in families who are not able to pay.

A dental program is not complete without research which may be undertaken as an integrated part of a well-balanced program. In Illinois, for example, an extensive research study was done on the use of ammoniated tooth powder. Participating were the College of Dentistry of the University of Illinois, the State Department of Public Health and two local communities. Two or three research studies in the technics for the topical application of fluoride were also carried out by the state dental unit, which led to economy in time and effort in topical fluoride programs.

It is the responsibility of the state dental administrative unit to develop practical plans that may be adopted by local communities and to help local communities organize and establish programs —sometimes financially. It is at the community level where the people are; it is there where the problem is, and there where the job must be done. In promoting community programs, the demonstration method has worked successfully in Illinois. The state dental unit has put on topical fluoride application programs that later have been taken over by the community on a permanent basis.

Aside from the general public who must understand and appreciate the program, the most important people concerned in achieving proper administrative status for a dental unit in a state health department are the members of the state dental society, the state health officer and the chief of the dental unit. The state dental society must be actively and aggressively interested in a practical public health dental program. In Illinois, the society expresses its interest through its council on dental health. The character of the members of this council, especially the chairman, will largely determine not only the kind of public health dental program but also the relationship be-

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tween the society and the state health department.

The council's public health interests should not be limited to dental health alone. In Illinois, largely through its council on dental health, the state dental society was active in the passage and implementation of a law that permitted the establishment of full-time county health departments. As a result, it is a legal requirement that a dentist be a member of every county and multiple-county board of health. Since 1943 when the law was enacted, 27 counties have taken advantage of it, and dentists have served as chairmen of several of the boards.

The state dental society should educate its membership in public health matters, and one way is through the conduct of workshops. The society should establish and maintain contact with the state health officer, because through him the interest of the dental profession can be expressed at the level where action is largely determined. The society should be helpful also in the selection of the administrator of the dental program, for the chief of the dental health unit in the state health department is the most important person in the whole picture with respect to both the success of a state-wide program and the administrative status of the dental unit.

THE AMENDED HOSPITAL CONSTRUCTION ACT: HOW IT AFFECTS DENTISTRY

Francis J. Garvey, LL.B., Covina, Calif.

In 1946, Congress approved the "Hospital Survey and Construction Act," popularly known as the "Hill-Burton Act." This Act authorized federal grants to states on a matching basis for the purpose of defraying part of the cost of constructing public or nonprofit hospitals and related health facilities. As a prerequisite to receiving grants, each state was required to survey its needs for the types of facilities authorized and to develop and maintain a list of existing hospital and related facilities.

On July 12, 1954, Congress amended the Act. Under the amendments, additional funds are made available to states for the purpose of surveying the need for, and subsequently of providing matching funds for, four classes of projects: (1) hospitals for the chronically ill and impaired, (2) nursing homes, (3) diagnostic centers or diagnostic and treatment centers and (4) rehabilitation facilities. To implement the 1954 amendments, Congress authorized annual appropriations of 60 million dollars during each of the fiscal years 1955, 1956 and 1957 to pay the federal share of the cost of constructing and equipping the facilities authorized under the amendments. These funds are in addition to the authorization of 150 million dollars under the pre-existing law.

Dentistry is principally concerned with that part of the law which authorizes the use of federal funds for diagnostic and treatment centers, because the law provides that funds may be made eligible for this type of construction where the completed facility is to be used for dental diagnosis and treatment and the facility is under the professional supervision of persons licensed to practice dentistry within the state. Diagnostic and treatment facilities which are part of a hospital have long been eligible for grants under the basic act. It must be presumed that

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dental facilities in connection with a hospital would be eligible types of facilities under either the initial act or under the 1954 amendments.

Specific regulations under the Act have not as yet been issued, but it may be assumed that they will follow generally the existing regulations under the old Hill-Burton Act. If this assumption is correct, then the provision of funds for dental facilities will require that (1) the facility involve dental diagnosis or treatment and be under the professional supervision of persons licensed to practice dentistry in the particular state, (2) the applicant for the federal grant be either a state, a political subdivision of the state, a public agency or a corporation or association which owns and operates a nonprofit hospital.

It would be difficult, then, for a private group organized as a not-for-profit association to secure funds merely for the establishment of a dental clinic since it is unlikely that such a group would own and operate a nonprofit hospital. A state university might be able to obtain funds for the construction of a clinic for its dental school since it is a public agency of the state. Similarly, the state itself, a county, a village or other political subdivision might apply for federal funds to assist in the construction and equipment of a dental clinic not connected with a hospital. It will probably be necessary that the treatment offered in such a facility be provided as a community service available to all residents in the area to be served by the facility without discrimination as to race, creed or color and that a reasonable volume of free patient care be furnished.

Under the law, the federal government will contribute a minimum of 33⅓ per cent of the cost of constructing and equipping an approved project. In states with low incomes, the federal government may advance as much as 66⅔ per cent of the cost.

Individuals or groups who feel that there is a need for dental diagnostic and treatment centers within their states should inquire of the state health department or other designated state agency as to whether the state agency would approve such a project, how much money would be available from state or political subdivision funds, how much federal assistance would be forthcoming and the priority such a project would receive in relation to all such state projects. From this basic information, programs can be developed, if feasible, for the provision of diagnostic and treatment centers that would be under the direction and control of dentists.

SUMMARY OF DISCUSSION ON COOPERATIVE PROJECTS OF STATE HEALTH DEPARTMENTS AND STATE DENTAL SOCIETIES

Conduct of Local Dental Surveys • There are many reasons for obtaining data on the occurrence of dental caries in population groups. The methods and procedures selected for the conduct of a survey will be determined largely by the purpose for which the data are to be used but may be further modified by the available resources of the community. For example, the practicing dentists in the community usually are called upon to make dental inspections. Their time is at a premium to provide dental health care for the people of the community. Dentists in public health must always be cognizant of this fact and, in program development, strive not to increase but to decrease the demands on the practicing dentists that take him from his office during office hours.

Another factor to be considered is the selection of methods and procedures

which cause the least interruption of the normal activities of the groups included in the survey—the group usually included is school children, because the community is interested in their health, they are readily accessible, and they are in a comparatively small area.

In many communities, the school-age population is so large that it is impractical to inspect every child, so a statistically sound sample must be selected. Until the development of standardized sampling worksheets, the selection required the expert assistance of a public health analyst. Now, if the worksheets are used, nearly anyone in the community can select the sample merely by obtaining and recording the total school enrollment and the enrollment for each school by grade and by classroom. Once the sample has been selected, various subcommittees go into action—the school committee, the committee on volunteers, the dental committee, the committee on publicity, the committee on analysis.

If there is an active health council, a committee on dental health can be formed within its framework. Dental health is a part of total health and should, wherever possible, be an integral part of the over-all health program. If there is no council, then a dental health committee can be formed which often provides the nucleus for a future health council. Dentists can serve most effectively on the committee as consultants.

The dental caries survey in which the lay person can play a part provides a definite project in which many can participate, a project which can achieve definite results in a short period of time, and in which the person participating can share in the recognition of its accomplishment. Such a survey is conducive to the organization of an active and functional committee and stimulates the continuance of the committee as a nucleus for community-wide dental health programming. It furthers the concept held by dentistry that the dental health of the people can best be improved through organized community programs of education and prevention.—*Lloyd F. Richards, D.D.S., M.P.H., San Francisco, chief, Division of Dental Health, State of California Department of Public Health*

A State Fair Dental Roengenographic Program • A dental roentgenographic program, together with an exhibit of dental health educational materials, was presented at the Florida State Fair at Tampa in February 1954. The program was sponsored by the Florida State Dental Society, the Florida State Board of Health, Bureau of Dental Health, and the local Hillsborough County Dental Society which staffed the booth that had been equipped by a dental supply firm. Roentgenograms were taken gratis of some 2,500 children between the ages of five and 13 years.

One of the most important factors in the presentation of such a mass educational project is early preplanning. The project must have the acceptance and approval of the state and local dental societies, and committees must be appointed. Funds must be budgeted for such items as decoration and wiring of the booth and the purchase of x-ray film. Voluntary manpower—dentists, assistants and clerical help—must be secured and oriented. The role of the dentists in developing and diagnosing the roentgenograms must be explained. Interest in the roentgenographic program must be developed throughout the school system, and methods of securing publicity—newspaper, radio and television—must be determined. Ways of displaying educational materials must be decided. Provision must be made for the evaluation of the entire program.

Experience with the program indicates that such a project can be a valuable asset to dental societies and health departments as an effective, low-cost way of reaching a vast number of persons, thus improving public relations

and promoting increased interest in dental health measures.—*Floyd H. DeCamp, D.D.S., Jacksonville, director, Bureau of Dental Health, Florida State Board of Health*

Observance of Children's Dental Health Week in New York • A very cordial working relationship has existed between the New York State Department of Health and the Dental Society of the State of New York for many years. Principal liaison has been through the council on dental health to which the director and the assistant director of the Bureau of Dental Health have been appointed consultants by the society.

The sponsorship of Children's Dental Health Week has been one of the major undertakings of the state society's council on dental health. One of the chief contributions by the Department of Health has been the development of a kit of suggested materials for use in New York state by district councils on dental health, dental hygienists and other interested groups. Another early contribution involved the development of a special pamphlet produced for distribution in 1952 and 1953 to the extent of one million copies and costing the Department of Health close to $6,000.

One of the most popular activities of the Bureau of Dental Health has been the annual production of a 15-minute recorded radio program, a copy of which is made available to every radio station in the state. The recordings have been produced and distributed with the cooperation of the State Department of Commerce Radio Bureau. A major factor in influencing the local broadcast of these programs has been the practice of making them "open-ended," that is, allowing for introductory and concluding statements by local dental society officers or other appropriate representatives of the Children's Dental Health Week Program.

The New York State Department of Health, through its Office of Health Education, issues a widely read monthly publication, entitled *Health News.* In connection with the 1954 Children's Dental Health Week celebration, the January issue was devoted to dental health. In addition to the usual 15,000 copies distributed to physicians and public health workers, the publication was sent to all 14,000 of the state's dentists.

In addition to the foregoing major activities, the Dental Bureau staff has participated in Children's Dental Health Week programs on radio and television and at public meetings, prepared and displayed a special exhibit at the dental health exposition sponsored by the Oral Hygiene Committee of Greater New York in 1953 and 1954 and prepared spot announcements for television and radio as well as increased the distribution of regular pamphlets, flip charts and, particularly, films which are generally available from our department. About 50 copies of 20 different dental health films are available. These are distributed without charge and, during the past few Children's Dental Health Week observances, every available film has been scheduled for full use.—*David B. Ast, D.D.S., M.P.H., Albany, director, Bureau of Dental Health, State of New York Department of Health*

A Continuing Education Program for Dentists • Georgia's first refresher course for dentists was conducted in 1938. When the second one was conducted in 1939, I envisioned the objectives of such a program as (1) to aid the practicing dentist, (2) to give dental health and preventive dentistry their rightful place in public health and education programs and (3) to create a closer relationship between the dental profession and the State Health Department. We are accomplishing these purposes. The Annual Dental Seminar, financed by the Georgia Department of Public Health and promoted as a joint project with the Georgia

Dental Association, has been the greatest contributing factor to the development of the very desirable working relationship which we enjoy in our state.

We believe that Georgia's continuing education program for dentists demonstrates an effective way in which a state health department can give direct assistance to state and district dental societies for the promotion of a program that benefits the dentists, public health personnel and the public.—*J. G. Williams, D.D.S., Atlanta, member, Georgia State Board of Health*

As the Georgia Dental Association and the Georgia Department of Public Health have planned together and worked together for successful programs of continuing education for dentists, some of the factors that have been found to be important are: (1) the selection of the best clinicians the country affords, varying the subjects from year to year and the inclusion of something practical that the dentists can use; (2) the planning of programs primarily for dentists, taking care to select one subject in the area of prevention or dental public health that will have public appeal; (3) the utilization of the press, radio, television, dental and public health journals to reach the dentists who do not attend as well as to educate the public; (4) the rotation of the meeting places from year to year accepting as nearly as possible the invitations from district dental societies, and selection of desirable meeting places with adequate facilities that provide a comfortable social atmosphere.

The Dental Division of the Health Department assumes the responsibility for working out the details of publicity, organization, local arrangements and so on.—*Annie J. Taylor, Atlanta, educational director, Dental Health Services, State of Georgia Department of Health*

Development of Community Topical Fluoride Programs • To promote the further use of topical fluoride programs and to bring this preventive technic to the attention of all dentists in the state, the Dental Section of the Michigan Department of Health in June 1947, with the approval of the council on health and education of the Michigan State Dental Association, prepared and circulated a pamphlet, entitled *Topical Sodium Fluoride Therapy for the Control of Dental Caries.* A film on technic was presented at all of our continuing education programs to most of the component societies of the state. In addition, the dental section prepared and made available free of charge to all dentists in the state the 2 per cent aqueous solution of sodium fluoride.

Other events in 1947 and 1948 that lent impetus to employment of the procedure included the appropriation of one million dollars by Congress for the Public Health Service for demonstration units which would operate in each state by invitation. The Michigan Department of Health was eager to develop continuing community programs and obtained the approval of the board of trustees of the Michigan State Dental Association for a P.H.S. demonstration topical fluoride team that would operate under the supervision of the state dental director.

Continuance of the program after the demonstration and initiation of new programs presented us with three major problems: providing equipment, procuring the money to finance the program and recruiting professional personnel. The initial step in each community was to mobilize the community resources and form a committee on which there was dental representation. All decisions were made at the local level, and all programs have been administered at that level.

Procurement of personnel presented the most serious problem. Through its council on health and education, the state dental association appealed an adverse ruling of the Attorney General on

dental hygienists' rendering the topical fluoride treatment, and, as a result, recently graduated dentists and hygienists were employed. The Michigan State Board of Dentistry, with the approval of the M.S.D.A. board of trustees, also granted permission to use junior dental students in summer programs under the general supervision of the dental staff of the state health department and the immediate supervision of the local dentists.

These programs have expanded each year to the extent that during the past summer (1954), 12 dental students, 30 student hygienists and five graduate hygienists were employed. Programs operated at 158 different centers in 37 counties and 24,500 children were treated, over 1,300 of whom were preschool children. The summer topical fluoride programs now provide this preventive measure to approximately 60,000 children (preschool, second, fifth and eighth grade) with an additional 60,000 under continuing treatment in a regular full-time program in numerous areas of the state and an unknown number under regular treatment in private offices. This extensive program is possible only because of the fine cooperation given the Dental Section of the Michigan Department of Health by the state dental association, the local dentists, the schools of dentistry in the state, the Michigan State Board of Dentistry and the Public Health Service.—*C. V. Tossy, D.D.S., M.P.H., Lansing, associate chief, Public Health Dentistry Section, Division of Local Health Administration, Michigan Department of Health*

Helping Communities to Appraise Fluoridation • As a service to the dentists as well as to the public, the Minnesota Board of Health, on December 21, 1950, adopted the following resolution:

BE IT RESOLVED, that the Minnesota State Board of Health recommend the fluoridation of public water supplies within the State of Minnesota, for the partial control of dental caries where such a program can meet and maintain the standards recommended by the State Health Authorities.

Providing the state's dentists with factual material on fluoridation, which they in turn can disseminate to their local lay groups, is a function of the Section of Dental Health of the Minnesota Department of Health. The state dental director will have information on where the local dentist or committee can obtain cost estimates on the program, what type of equipment is necessary and what fluoride compound to use. He can assist in obtaining water analysis. He can make known the sources of slides, films and literature other than his state health department.

The dental director can assist further by testifying before the local city council when adoption of fluoridation is being considered. The city council of Minneapolis held three hearings before it approved fluoridation. At all hearings, the state dental director, as well as other source personnel, was present to assist local dentists. When the Section of Dental Health learns of a community that has approved the program through council action, the Minnesota Department of Health sends a letter of congratulations signed by its health officer and expresses the hope that the council will stand by its positive action for the best in dental health for its people.

The Department of Health has suggested to each community planning to adopt fluoridation that a base line of the dental needs is essential for future evaluation of the fluoridation or any other dental program. The dental director meets with the dental group on request, explains the type of survey necessary and how it can best be conducted; reviews with the group the survey forms to be used and how the data are to be recorded; explains how lay groups, such as mothers and teachers, can record data, and how all the dentists in small communities can cooperate.

After the actual examinations and recording of these surveys, the forms are sent to the Section of Dental Health for analysis. A complete report on the analysis is returned to the local community for filing and future comparison. These base-line surveys help the Section of Dental Health to obtain a state-wide index of dental needs and to determine the amount of dental care being given to Minnesota children—information which is valuable both to the health department and the dental profession.—*William A. Jordan, D.D.S., M.P.H., Minneapolis, chief, Section of Dental Health, Minnesota Department of Health*

Utilization of Dental Consultants in Dental Health Programs • Eighty-nine dental coordinators or consultants have been appointed through the district dental societies and are well distributed over the state. Each coordinator represents the Arkansas State Dental Association in his area. We in the State Health Department keep these men supplied with the latest information on fluoridation, with authoritative source material for the school people and with information on our program and policies and on policies of the state dental association.

If a community writes to us for help on a dental program, we refer the request to the coordinator of the district involved. Under our guidance, he tries to help the community. If the assistance is insufficient, then we enter into the picture as the final authority.

If a school needs material for an educational program, we ask the local consultant to confer with the school health coordinator. They may decide they need certain literature of which the consultant had sample copies. We order the requested literature, or if we feel a better choice might have been made, we offer suggestions, working through the consultant as much as possible.

The results of our program show that (1) we are getting a job done, partly through delegation of activities which is good administration; (2) we are increasing the interest and knowledge of the private practitioners in public health through their active participation in our program; (3) organized dentistry is brought into the program on an actively participating basis as part of the over-all public health dental program; (4) the dental society is developing excellent public relations, for the program indicates to the public that the dentists are desirous of helping the public solve its health problems, and (5) it takes the public health administrator out of the isolation ward in which he sometimes finds himself because of the profession's lack of understanding of what he is trying to do.

The complete cooperation of the Arkansas State Dental Association is probably one of the strongest points in our program in Arkansas.—*H. Shirley Dwyer, D.D.S., Little Rock, dental director, Division of Dental Hygiene, Arkansas State Board of Health*

BUREAU OF ECONOMIC RESEARCH AND STATISTICS

Changes in the distribution of dentists during 1952-1954

It is a well-known fact that the geographical distribution of dentists in the United States does not correspond closely with the distribution of population. The number of dentists per 100,000 population is more than four times as high in New York as it is in South Carolina. Counties and cities have even more variation in their population-dentist ratios than do the states.

In 1953 the Bureau of Economic Research and Statistics began annual publication of a booklet showing the distribution of dentists throughout the United States by county. These booklets also present information for districts, which are groups of counties, for regions, which are groups of districts, and for states. The counts of dentists are made from the *American Dental Directory*, and include all persons with the dental degree, whether or not active in the profession.

Three booklets in this series have now been published, presenting information for 1952, 1953 and 1954. The first two editions were sent to all senior student members of the Association, and the last edition was sent to both seniors and juniors. Copies are also sent on request to many individual dentists seeking locations.

Analysis of the population-dentist ratios for these three years indicates that the distribution of dentists improved from 1952 to 1953 and again from 1953 to 1954. By "improved" it is meant that the distribution of dentists corresponded more closely with the distribution of population in each succeeding year than in the preceding year. To what extent this change was due to the dissemination of pertinent information to dentists seeking locations is not known, but it seems reasonable to assume a cause-and-effect relationship.

Tables 1 and 2 show the percentage of counties whose population-dentist ratios were lower, higher or the same in 1953 as in 1952 and in 1954 as in 1953. This information (with the exception of counties with unchanged ratios) is presented graphically in Figures 1 and 2. These tables and figures show that a high percentage of the counties with high population-dentist ratios experienced a reduction in those ratios in 1953 and 1954 from the preceding years. Fewer of the counties with medium population-dentist ratios lowered those ratios from year-to-year. Among counties with existing ratios of less than 1,500, a majority incurred increases rather than decreases in population-dentist ratios.

As shown in Tables 1 and 2, approximately one half of all counties experienced an increase in supply of dentists' services in relation to population from each year to the next, about one third reported a decrease, and the rest remained constant. Figures 1 and 2 show that the reductions in population-dentist ratios occurred where they were needed most, and the increases took place in counties best able to stand an increase. These data with respect to counties are in accord with the studies of the state-to-state relocation of dentists conducted by the Bureau of Economic Research and Statistics, which have shown that dentists tend to move to states most needing dentists.

Another approach to the study of changes in population-dentist ratios is to

Table 1 • Percentage of counties in which population-dentist ratio in 1953 was higher, lower or the same as in 1952, according to the 1952 ratio

1952 ratio	Percentage of counties			
	Same ratio in 1953	Higher ratio in 1953	Lower ratio in 1953	Total
Under 1,500	4.0	56.1	39.9	100.0
1,500–1,999	6.0	45.9	48.1	100.0
2,000–2,499	7.6	38.1	54.3	100.0
2,500–2,999	7.5	44.2	48.3	100.0
3,000–3,999	6.1	41.1	52.8	100.0
4,000–4,999	5.3	29.3	65.4	100.0
5,000–5,999	6.1	35.8	58.1	100.0
6,000–6,999	6.0	28.6	65.4	100.0
7,000–7,999	2.1	28.7	69.2	100.0
8,000–8,999	6.5	38.7	54.8	100.0
9,000–9,999	9.5	19.1	71.4	100.0
10,000—	7.4	25.2	67.4	100.0
No dentists	91.5	...	8.5	100.0
All counties	13.1	36.1	50.8	100.0

Table 2 • Percentage of counties in which population-dentist ratio in 1954 was higher, lower or the same as in 1953, according to the 1953 ratio

1953 ratio	Percentage of counties			
	Same ratio in 1954	Higher ratio in 1954	Lower ratio in 1954	Total
Under 1,500	10.6	57.3	32.1	100.0
1,500–1,999	9.8	42.9	47.3	100.0
2,000–2,499	9.7	37.4	52.9	100.0
2,500–2,999	12.5	38.9	48.6	100.0
3,000–3,999	10.5	30.3	59.2	100.0
4,000–4,999	8.8	38.2	53.0	100.0
5,000–5,999	15.0	26.9	58.1	100.0
6,000–6,999	10.7	30.8	58.5	100.0
7,000–7,999	7.5	28.8	63.7	100.0
8,000–8,999	5.6	18.5	75.9	100.0
9,000–9,999	11.8	14.7	73.5	100.0
10,000—	12.9	18.2	68.9	100.0
No dentists	90.6	...	9.4	100.0
All counties	17.0	33.2	49.8	100.0

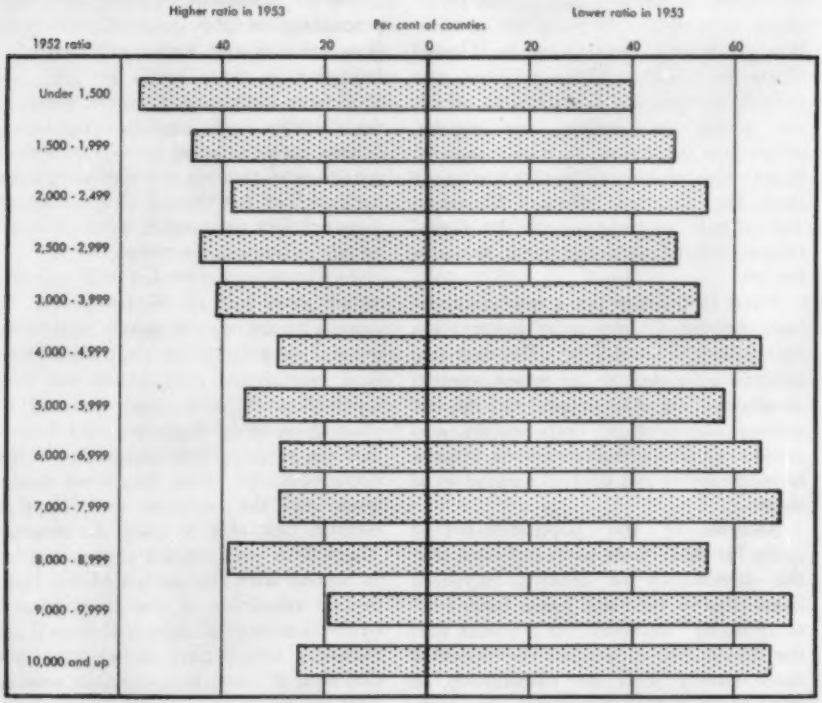

Fig. 1 • Percentage of counties in which population-dentist ratio was higher or lower in 1953 than in 1952, according to 1952 ratio

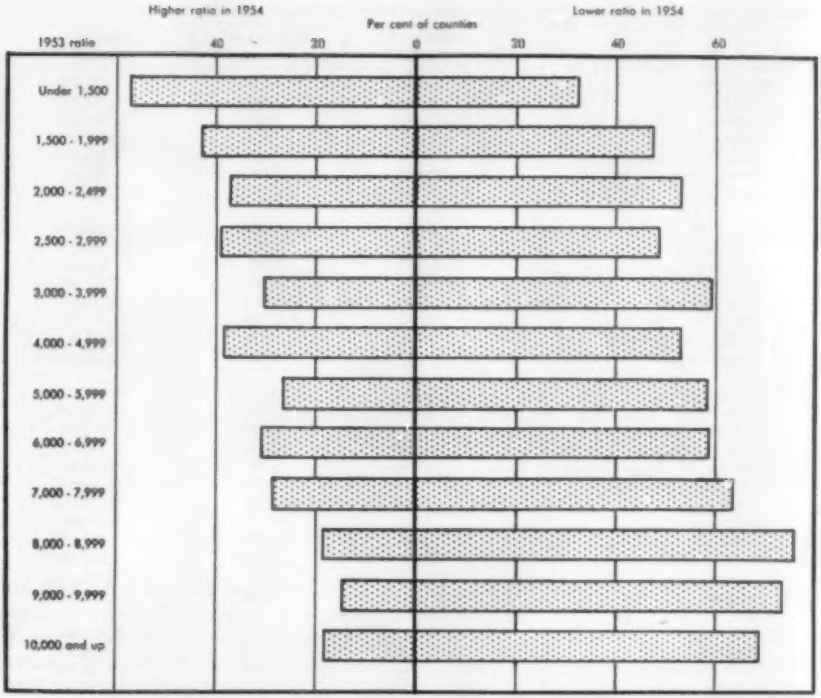

Fig. 2 • Percentage of counties in which population-dentist ratio was higher or lower in 1954 than in 1953, according to 1953 ratio

compare a measure of the dispersion of the ratios in each of the three years. The measure of dispersion selected is the standard deviation. It is calculated by summing the squares of the deviations of individual ratios from the mean ratio, dividing by the number of ratios and extracting the square root of this quotient.

As shown in Table 3, the standard deviation of ratios was less in 1953 than in 1952, and less in 1954 than in 1953. The coefficient of variation (standard deviation divided by mean) also declined. This was true not only of counties but also of districts, regions and states. This means that the ratios were more similar,

Table 3 • Measures of dispersion of population-dentist ratios, by county, district, region and state

	1952			1953			1954		
	Standard deviation	Mean ratio	Coefficient of variation	Standard deviation	Mean ratio	Coefficient of variation	Standard deviation	Mean ratio	Coefficient of variation
County	3,368	3,953	85.2	3,259	3,868	84.3	3,063	3,815	80.3
District	2,212	3,258	67.9	1,936	3,155	61.4	1,808	3,081	58.7
Region	1,117	2,544	43.9	1,054	2,494	42.3	1,002	2,446	41.0
State	989	2,363	41.9	919	2,303	39.9	865	2,263	38.2

Table 4 • Distribution of dentists in the United States and its territories and possessions in 1954

Region and state	Number of dentists	Population per dentist	Estimated population
New England	6,413	1,505	9,653,500
Connecticut	1,576	1,362	2,146,300
Maine	446	2,027	904,200
Massachusetts	3,429	1,414	4,847,900
New Hampshire	284	1,929	547,900
Rhode Island	500	1,650	825,100
Vermont	178	2,147	382,100
Middle East	26,258	1,425	37,404,900
Delaware	143	2,427	347,100
District of Columbia	773	1,082	836,000
Maryland	1,012	2,591	2,622,300
New Jersey	3,460	1,516	5,246,300
New York	13,583	1,148	15,588,300
Pennsylvania	6,586	1,634	10,758,700
West Virginia	701	2,862	2,006,200
Southeast	10,601	3,160	33,500,300
Alabama	844	3,705	3,127,400
Arkansas	499	3,804	1,898,400
Florida	1,580	2,097	3,313,700
Georgia	956	3,770	3,604,400
Kentucky	1,016	2,965	3,012,600
Louisiana	1,043	2,752	2,870,800
Mississippi	540	4,111	2,219,800
North Carolina	1,166	3,678	4,289,100
South Carolina	448	4,958	2,221,100
Tennessee	1,340	2,517	3,372,600
Virginia	1,169	3,054	3,570,400
Southwest	4,142	3,011	12,473,600
Arizona	308	2,943	906,500
New Mexico	212	3,609	765,200
Oklahoma	857	2,673	2,291,100
Texas	2,765	3,078	8,510,800
Central	24,777	1,693	41,936,400
Illinois	6,139	1,473	9,042,200
Indiana	2,048	2,050	4,197,800
Iowa	1,632	1,626	2,653,700
Michigan	3,479	1,991	6,928,400
Minnesota	2,266	1,361	3,084,200
Missouri	2,443	1,684	4,114,500
Ohio	4,307	1,939	8,351,500
Wisconsin	2,463	1,447	3,564,100
Northwest	4,576	1,856	8,493,400
Colorado	846	1,759	1,487,700
Idaho	280	2,220	621,500
Kansas	994	2,085	2,072,400
Montana	334	1,824	609,100
Nebraska	936	1,468	1,373,900
North Dakota	283	2,159	610,900
South Dakota	306	2,137	654,000
Utah	445	1,694	753,800
Wyoming	152	2,040	310,100
Far West	10,981	1,508	16,557,600
California	8,049	1,509	12,142,400
Nevada	100	1,972	197,200
Oregon	1,147	1,460	1,674,100
Washington	1,685	1,510	2,543,900
Total number listed by state	87,748		

Region and state	Number of dentists	Population per dentist	Estimated population
Federal Dental Services	8,135		
Air Force	1,848		
Army	2,707		
Navy	2,293		
Public Health Service	291		
Veterans Administration	996		
United States	95,883	1,669	160,019,700
Territories and Possessions			
Alaska	42	4,071	171,000
Guam	9	6,611	59,498
Hawaii	290	1,669	484,000
Marshall Islands	1	.....	.....
Panama Canal Zone	10	4,200	42,000
Puerto Rico	267	8,318	2,221,000
Virgin Islands	2	11,000	22,000

Sources: Number of dentists is based on a count of dentists listed in the 1955 American Dental Directory. Retired dentists are included. Populations of states and regions are estimates as of January 1, 1954, from Sales Management, May 10, 1954. These estimates are copyrighted by Sales Management and are included through the courtesy of that magazine. Populations of Alaska, Hawaii, Panama Canal Zone, Puerto Rico and Virgin Islands are estimates of July 1, 1954, from Current Population Reports, Population Estimates, Series P-25, No. 104, Bureau of the Census, October 25, 1954. Population of Guam is as of April 1, 1950, and is from the same series, No. 2, February 14, 1951.

less disparate, in each year than in the previous year. The standard deviation of county population-dentist ratios was reduced from 3,368 in 1952 to 3,063 in 1954; district ratios from 2,212 in 1952 to 1,808 in 1954; region ratios from 1,117 in 1952 to 1,002 in 1954, and the standard deviation of state ratios from 989 in 1952 to 865 in 1954.

These are substantial improvements in the uniformity of the distribution of dentists. It appears that if this trend continues it will not be many years until it will be inaccurate to refer to "the maldistribution of dentists."

The distribution of dentists in 1954 is shown in Table 4. As another indication of the trend toward a more even distribution, all 27 states which had population-dentist ratios of more than 2,000 in 1953 had lower ratios in 1954. Conversely, of the 21 states which had less than 2,000 persons per dentist in 1953, 13 states had higher ratios in 1954. All 15 states in the southeastern and southwestern regions of the country, which for years have trailed the nation in ratio of dentists to population, showed improved ratios in 1954.

The booklet *Distribution of Dentists in the United States by State, Region, District and County* may be obtained on request to the Bureau of Economic Research and Statistics. In addition to information on the distribution of dentists and population, it contains information on population growth, per capita income and per capita retail sales by county, district, region and state.

B. Duane Moen, Director

COUNCIL ON FEDERAL DENTAL SERVICES
SUBCOMMITTEE ON CIVIL DEFENSE

Operation cue

Carl L. Sebelius, D.D.S., M.P.H., Nashville, Tenn.

I was privileged to represent the American Dental Association at one of the world's most spectacular and expensive demonstrations—"Operation Cue"—held at Las Vegas, Nev. and Yucca Flat last spring.

I was one of a group of approximately 1,700 observers, 500 medical people, 400 civil defense volunteers and 4,000 military personnel that assembled on April 22, 1955 to participate in and observe an atomic program that had been arranged by the Federal Civil Defense Administration, the Atomic Energy Commission and the Department of Defense. All waited in anticipation of the detonation of an atomic bomb, scheduled to be set off on Tuesday, April 26, at 5:10 A.M. at Yucca Flat. Some of the effect of the program was lost as weather conditions required postponement of the blast until Thursday morning, May 5.

The first meeting on Saturday, April 23, was informational in nature and acquainted those in attendance with the effects of an atomic explosion and the need for more concrete plans for the protection of people should a major atomic catastrophe occur. Among the speakers were Governor Val Peterson, administrator of the Federal Civil Defense Administration; Mr. Harold L. Goodwin, director of Civil Defense Operations; Dr. John von Neumann, of the Atomic Energy Commission; Dr. Alvin C. Graves, scientific adviser to the Test Management, and Dr. Gordon Dunning, member of the Test Management's Advisory Panel. Mr. Goodwin served as moderator.

Some important information was presented regarding a recent survey that had been held to ascertain the extent of people's knowledge about nuclear weapons and their effects. The survey revealed that 19 per cent of the people questioned had not heard of the hydrogen bomb and that 17 per cent thought that everyone within a radius of ten miles would be killed if a hydrogen bomb was set off.

It was brought out that hazardous atomic explosions can be conducted without danger to residents of the area and to other parts of the United States. Information was presented about the completeness of the radiation monitoring stations, the location of weather stations and the forecasting of weather conditions prior to setting off of the bomb. The total radiation that the average American had received from the 44 detonations which have been set off in the United States is about equal to that received from one chest roentgenogram.

The group was advised that 3.9 roentgens per year per person is the standard guide used, and when the fallout of radioactive material had exceeded this amount in any area, the succeeding shot was postponed until a more favorable time. Since the people of Elgin, 45 miles from the test site, had received 3.5 roentgens of radiation after the April 15 shot, one of the scheduled shots was postponed

Report to the Subcommittee on Civil Defense, American Dental Association.

Chairman, Subcommittee on Civil Defense of the Council on Federal Dental Services, American Dental Association; director, Division of Dental Health, State of Tennessee Department of Public Health.

for more favorable weather. It takes 25 roentgens and, for many individuals, 50 roentgens to produce detectable effects on the body. Radiation sickness follows exposure to somewhere between 75 to 100 roentgens; serious illness, from which people will recover with proper attention, will result after exposure to 200 roentgens. Exposure to 400 roentgens in a brief period will probably kill 50 per cent of the people exposed.

There is an almost instantaneous release of energy by fission or fusion of atoms in a nuclear explosion which is accompanied by the production of extremely high temperatures. After a few millionths of a second, the burst begins to appear as a fireball with a light equal to 100 suns. The ball of fire grows, and a shock wave develops. Soon the shock wave separates itself, and after a lapse of ten seconds the shock wave has traveled about 12,000 feet and the ball of fire has floated up about 1,500 feet. For civil defense purposes, it may be considered that damage from this cause is essentially over within 90 seconds, with the greatest amount of radiation being emitted within the first few seconds.

The variation of the range of damage due to the size of the weapon was described. Charts were given out so that an estimate could be made of the blast damage from various types and sizes of nuclear explosions, and discussions were held on nuclear radiation.

On Sunday, April 24, I, together with other medical and civil defense volunteers, traveled in 54 large Greyhound buses to observe the place where a few days later the effects of an atomic blast would be demonstrated on many types of equipment. The convoy left Las Vegas at 9:30 A.M. and arrived at Media Hill, eight miles from the tower which contained the atomic bomb, at 11:45 A.M.

After a somewhat delayed lunch, the convoy left for Survival City where the many houses and other equipment necessary for an average town were examined. Spotted from one to three miles from the blast were ten homes, six small industrial type structures, a radio station with two tall antennae and transmission towers, two complete electric power lines, gas mains, more than two dozen trucks and trailers and many other types of equipment. The material and equipment were valued at nearly two million dollars and were set up in a pie-shaped area pointed toward the 500 foot tower which contained the atomic bomb. In these houses were various types of shelters.

The observers were informed that 65 major experiments were to take place in this operation. The homes were similar to those occupied by average American families, and it hardly seemed possible, after viewing this city, that within a few days much of it would be destroyed. The observer area was approximately eight miles from the tower; however, there were to be 13 observers stationed 7,800 feet away at the time the blast went off and at 10,500 feet there were to be tanks and supporting armored personnel.

The group inspected the houses and equipment which were stationed at 4,700, 5,500, and 10,500 feet from the tower. At the time of the blast it was planned that there would be a major Army maneuver which was explained to the group.

On the Monday after the visit to the test site, the briefings continued in Las Vegas, where the group heard Dr. Bruce Johnson, of the University of Michigan, tell of the effect of blasts on structures. Dr. Herman Pearse, professor of surgery at the University of Rochester, described the medical effects of thermoradiation; Dr. John Bugher, director of the Atomic Energy Commission's Division of Biology and Medicine, discussed fallout problems as they affect civil defense and the military participation in the Nevada Test Series.

The test scheduled for Tuesday had to be postponed because of weather conditions. Delays and postponements continued until finally, on Thursday, May 5,

the bomb was set off. The effect was shown throughout the country on television and in newspapers. It was stated that nearly one million dollars was spent in televising Operation Cue.

Each of the trips to the test site meant traveling nearly 90 miles from Las Vegas. The group left Las Vegas by convoy shortly after midnight and arrived at Media Hill at 3 A.M. The first morning, after we had been in the cold for nearly one hour, the test was postponed and everyone was exceedingly disappointed. The second postponement took place approximately 15 minutes before shot time; these postponements hurt the effectiveness of the over-all program, since many people were forced to leave before the completion of the entire program.

All who were privileged to attend Operation Cue were extremely impressed with their obligation to assist in the preparation of more adequate civil defense programs. I feel strongly that every effort should be put forth to promote more interest among the members of the dental profession in the role that they might play in the civil defense program of this country. Such an operation demonstrated the need for teamwork and training which is so essential in the operation of a well-organized and planned civil defense program.

COUNCIL ON DENTAL RESEARCH

Revision of list of certified dental materials

Samples of the certified wrought gold wire alloys were recently retested by the American Dental Association Research Fellowship at the National Bureau of Standards under the supervision of that Bureau. These materials were found to comply with American Dental Association Specification No. 7 for Wrought Gold Wire Alloys. This list supersedes that published in the February 1955 issue of THE JOURNAL.

CERTIFIED WROUGHT GOLD WIRE ALLOYS (A.D.A. SPECIFICATION NO. 7)

Alloy	*Manufacturer or distributor*
Aderer No. 20 Clasp	Julius Aderer, Inc.
Baker Q. A.	Baker & Co., Inc.
Crown Hylastic	General Refineries, Inc.
Deepep-Hard	Dee Division of Handy & Harman
GB Extra High Fusing; Medium Fusing; Regular High Fusing	Goldsmith Bros. Smelting & Refining Co.
Jelenko No. 3 Wire; Super Wire	J. F. Jelenko & Co., Inc.
Ney-Oro Elastic No. 4	The J. M. Ney Co.
Spyco No. 2; No. 4	Spyco Smelting & Refining Co.
S. S. White No. 12; No. 61 Metalba	The S. S. White Dental Mfg. Co.
Stern No. 2657	I. Stern and Co., Inc.
Vernon-Benshoff Clasp Wire No. 6	Vernon-Benshoff Co.
Williams No. 1 Super; No. 2 High Fusing Clasp; No. 3 High Tensile	The Williams Gold Refining Co., Inc.

Resin cements

In 1952 dental resin cements not only were introduced as outright substitutes for zinc phosphate cements but occasionally were advertised as being definitely superior. At the present time there are several dental resin cements available commercially.

COMPOSITION

The resin cements appear to be essentially acrylic resins and are somewhat similar to the direct filling resins.[1] One of the chief differences between the powders of the direct filling resins and the resin cements is the presence of mineral fillers in the latter. The liquids appear to be largely methyl methacrylate monomer. Arsenic is not present in significant amounts.[2]

TIME OF SETTING

The resin cements harden rapidly.[1] The time of setting, in general, does not vary greatly with different consistencies of mix.[2] In other words, the powder-liquid ratio is not critical with respect to the time of hardening. In this regard the resin cements are superior to the zinc phosphate cements. Eugenol and other phenolic compounds suppress polymerization and thus prolong the time of setting indefinitely. Therefore, the resin cements should never be used in teeth which have been previously treated with eugenol or eugenol-containing materials.

SOLUBILITY

The pure acrylic resins are insoluble in the mouth fluids. However, the resin cements, because of the presence of catalysts, promoters and somewhat soluble inorganic fillers may be as soluble in water as the zinc phosphate cements.[2] The resin cements when exposed to water usually maintain their gloss and high polish. In a few instances, where carbonate fillers are used, breaks in the continuity of the polished surface occur.[3]

DIMENSIONAL STABILITY

The resin cements shrink on hardening. The shrinkage depends on the amount of monomer present in the mixed unhardened cement.[3] This shrinkage during polymerization may not be of great consequence in actual clinical use because the film of cement between the inlay and the tooth is thin and the shrinkage is proportional to the film's thickness. For example, if the cement film were 100 microns thick and the linear shrinkage of the resin cement were 2 per cent, the actual shrinkage in thickness of the film would only be 2 microns. Of course the proportional shrinkage does not hold if the particle size of the cement filler approaches the film thickness.

The resin cements expand on the absorption of water to about the extent of the direct filling resins.[3]

The thermal expansion of the resin cements is much higher than that of the teeth but lower than that of the direct filling resins. The addition of the inorganic filler reduces the expansion of the resin cements.[4]

Prepared for the Council on Dental Research by George C. Paffenbarger and Paul J. Schouboe.

1. Schouboe, Paul J., and Paffenbarger, G. C. Dental resin cements and direct filling resins advocated for posterior teeth (Abst.) J.D. Res. In press.

2. Paffenbarger, G. C., and Caul, H. J. Resin cements and direct filling resins for posterior teeth. (Abst.) J.D. Res. 33:698 Oct. 1954.

3. Schouboe, Paul J.; Paffenbarger, G. C., and Sweeney, W. T. Resin cements and direct filling resins (posterior type). Manuscript in preparation.

4. Rose, E. E., and others. Direct resin filling materials: coefficient of thermal expansion and water sorption of polymethyl methacrylate. J.D. Res. 34:589 Aug. 1955.

FILM THICKNESS

The thickness of the film of cement between the inlay and the surface of the cavity should be kept to a minimum in order to assure proper seating of the inlay. Resin cements can be produced with a film thickness lower than that of the zinc phosphate cements.[1]

MECHANICAL PROPERTIES

The resin cements are softer than and not as stiff as the zinc phosphate cements but have about the same compressive strength.[2]

OPACITY

Resin cements can be made as radiopaque as zinc phosphate cements.[1] The radiopacity of a cement should be high when the cement is used as a base or in cementing radiopaque objects such as a gold inlay, so that the shadow cast by the cement will not be confused with recurrent decay.

The resin cements can be made with an optical opacity range similar to that of dentin and enamel.[2] Thus, they would be suitable for the cementing of translucent restorations such as a porcelain jacket crown or a porcelain inlay.

COLOR STABILITY

The resin cements, like the early direct filling resins, are not color stable when exposed to artificial sunlight.[1] Since it has been possible to make direct filling resins color stable on exposure to light, it should be possible to make color-stable resin cements.

ADHESION

None of the resin cements or the direct filling resins adhere to the hard tooth tissues under oral conditions.[1] Resin cements will adhere to the surface of a dry extracted tooth. If, however, the tooth is immersed in water, the cement will come off within two weeks. This loss of adhesion may be caused by the expansion on absorption of water.

EFFECT ON PULP

There appears to be little or no literature available on the possible damage to the pulp by the resin cements. On the other hand, there is considerable evidence that direct filling resins irritate the pulp, sometimes fatally.[5,6] McLean and Kramer[7] suggested that resolution was the usual outcome of the inflammatory pulp changes caused by the direct filling resins. This was likewise the opinion of a conference of investigators who surveyed the available evidence in 1951.[8] Because of the similarity between the direct filling resins and the resin cements, it could be assumed that the latter would also irritate the pulp. It has not been determined what constituents of the direct filling resins cause the irritation. It may be one or more of the additives, which include inhibitors, accelerators or promoters, catalysts, antioxidants, or, as many suspect, the residual monomer that is left by incomplete polymerization. Therefore, an adequate bio-assay of the resin cements is needed before a proper evaluation of their usefulness in dentistry can be made.

CLINICAL STUDIES

With the exception of the work of Johnston and associates,[9,10] the Council's con-

5. Grossman, L. I. Pulp reaction to the insertion of self-curing acrylic resin filling materials. J.A.D.A. 46:265 March 1953.

6. Nygaard-Ostby, B. Pulp reactions to direct filling resins. J.A.D.A. 50:7 Jan. 1955.

7. McLean, John W., and Kramer, Ivor R. H. Clinical and pathological evaluation of a sulphinic acid activated resin for use in restorative dentistry. Brit. D.J. 93:255 Nov. 18, 1952.

8. American Dental Association, Council on Dental Research and Council on Dental Therapeutics. Status report on the reactions of the pulp to self-curing resinous filling materials. J.A.D.A. 42:449 April 1951.

sultants are not familiar with clinical studies on the resin cements. These investigators, who used an experimental resin cement in 800 clinical cases, stated that so far the results were quite satisfactory but that the duration of the observations was entirely too short to provide a satisfactory evaluation of the cement they used.

SUMMARY

Currently there are several resin cements on the market which are advocated as substitutes for zinc phosphate cements.

These resin cements are similar to the direct filling resins. The powders usually contain considerable quantities of mineral fillers. The time of setting, solubility in distilled water and compressive strength are similar to those of the zinc phosphate cements.

The resin cements shrink on hardening, expand on sorption of water and have a high thermal expansion. Therefore, they are not as stable dimensionally as desired.

The resin cements can be made as radiopaque as the zinc phosphate cements or as optically opaque as the silicate cements, depending upon the mineral filler employed.

The color stability, as determined by exposure to artificial sunlight, is poor.

The thickness of the film of resin cement between an inlay and the tooth can be made considerably thinner than the ordinary film thicknesses of the zinc phosphate cements.

The resin cements are adhesive to the hard tooth tissues when dry but rapidly lose this adhesion when submerged in water or saliva.

An adequate bio-assay of the resin cements and additional documented clinical studies are needed.

From the foregoing, the Council on Dental Research considers that the resin cements are in a developmental stage and should be used accordingly as experimental materials.

9. Johnston, J. F. One-year evaluation of an acrylic cement. J. Pros. Den. 4:689 Sept. 1954.

10. Johnston, J. F.; Phillips, R. W., and Swartz, M. L. Laboratory and clinical investigation of certain resin restorative and cement materials, II. A twenty-eight month clinical evaluation of a resin cement. Presented at the 33rd general meeting of the International Association for Dental Research, Chicago, Ill., March 18-20, 1955.

Revision of list of certified dental materials

Whenever a revision of an American Dental Association specification is adopted, the manufacturers are invited to certify that their products will comply with the requirements of the revision. Recently manufacturers of the denture base resins on the List of Certified Dental Materials were invited to certify to the Council on Dental Research that their products comply with the second revision, effective July 1, 1953, of American Dental Association Specification No. 12 for Denture Base Resin (J.A.D.A.

46:54 Jan. 1953). The procedure of certification is explained in detail in the *1955 American Dental Association Specifications for Dental Materials.*

Samples of the certified denture base resins were tested by the American Dental Association Research Fellowship at the National Bureau of Standards under the supervision of that Bureau. The following certified materials were found to comply with the revised specification. This list supersedes that published in the February 1955 issue of THE JOURNAL.

CERTIFIED DENTURE RESINS (A.D.A. SPECIFICATION NO. 12—SECOND REVISION)

TYPE I, HEAT-CURING

Material	*Form*	*Manufacturer or distributor*
Acralite	Clear; pink; powder-liquid	Acralite Co., Inc.
Acri-Lux	Pink; powder-liquid	Acri-Lux Dental Mfg. Co.
Acrylic A Pink	Pink; powder-liquid	Austenal Laboratories, Inc.
Acrylic A Mottled	Pink; powder-liquid	
Acrylic A Orange Pink	Pink; powder-liquid	
Densene 33	Clear; pink; powder-liquid	Cosmos Dental Products, Inc.
Densene 33, Varihued	Pink; powder-liquid	
Denture Acrylic	Clear; pink; powder-liquid	The S. S. White Dental Mfg. Co.
Duraflow	Pink; powder-liquid	Product Research Lab., Inc.
Enciton	Pink; powder-liquid	The L. D. Caulk Co.
Hygienic	Pink; powder-liquid	The Hygienic Dental Mfg. Co.
Improved Justi-Tone T-3	Pink; powder-liquid	H. D. Justi & Son, Inc.
Jectron	Pink; precured blank	Toledo Dental Products Co.
Lang's	Pink; powder-liquid	Lang Dental Mfg. Co.
Lucitone	Clear; pink; powder-liquid Pink; plastic cake	The L. D. Caulk Co.
Luxene 44	Pink; plastic cake	Luxene, Inc.
Miracryl	Pink; powder-liquid	The Motloid Co., Inc.
Palatex	Pink; powder-liquid	Rockland Dental Co., Inc.
Perma Cryl	Pink; powder-liquid	Acri-Lux Dental Mfg. Co.
Vernonite	Clear; pink; plastic cake Pink; powder-liquid	Vernon-Benshoff Co.
Vitacrylic	Pink; powder-liquid	Fricke Dental Mfg. Co.
Vita-Lite	Pink; powder-liquid	Vita-Lite Products Co.
Vitalon Even Tone	Pink; powder-liquid	Austenal Laboratories, Inc.
Vitalon Mottle Tone	Pink; powder-liquid	
Vitalon Tissue Tone	Pink; powder-liquid	

TYPE II, SELF-CURING

Material	*Form*	*Manufacturer or distributor*
Acralite 88, Tissue Tone	Pink; powder-liquid	Acralite Co., Inc.
Acralite 88, True Life	Pink; powder-liquid	
Densene 33	Pink; powder-liquid	Cosmos Dental Products, Inc.

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Editorials

Clinical testing of dental caries preventives

Recently The American Dental Association subjected the problem of uniform standards and procedures in clinical studies of dental caries to extensive study at a conference sponsored jointly by the Councils on Dental Therapeutics, Dental Research and Dental Health. A report of the conference and the recommendations resulting therefrom are contained in a sixty-eight page brochure—just published—entitled *Clinical Testing of Dental Caries Preventives.*

The Association has long recognized the existence of the many problems involved in the establishment of caries research criteria. A quarter of a century ago, the Committee on Standardization of Dental Examinations[1] presented to the Association an extensive classification of dental examinations based on the purpose of the examination. Sixteen years ago Deatherage, Wilson and Ledgerwood[2] called attention to the variability of routine diagnoses of dental defects among school children. Since then many others have written on the subject.

Methods of study of caries from an epidemiological point of view have been fairly well standardized in the past twenty-five years, and it is now possible to determine differences in prevalence of dental decay in various geographical areas at a given time. But methods applicable to such an investigation are not altogether suited to the problem of determining through clinical data the effect, if any, of a preventive measure on a limited group of subjects during a chosen period of time. It is for this second type of much needed investigation that the present project of standardizing methods of research was undertaken. Up to the present, with the lack of uniformity in methods employed in different field tests, it has been difficult to compare the results of one observer with those of another. The principles set forth in the brochure, it is believed, will do much to obviate such differences.

Briefly but thoroughly the report presents the fundamental principles essential for the development of uniform standards and procedures in the clinical study of dental caries. The difference between a dental survey and a dental examination is explained, and the difficulty of comparing the findings of one with the other is discussed. The necessity of establishing a uniform standard for measuring the incidence and prevalence of caries forms a major chapter in the book. After considering five different classes of units for caries measurements—the subject or individual, the tooth, the tooth surface, and cavity and units of measurement smaller than the tooth surface—the conference concluded that "the surface index is the most complete expression of caries increment during a test period."

Other subjects covered in the report include standardization of dental examinations, methods for the control of variables, the use of laboratory tests in a clinical study, methods of conducting an investigation, and how to analyze data, evaluate results and present findings of a study in accordance with acceptable scientific methodology.

Dentistry is indebted to the participants of the conference and the three sponsoring Councils for their action in formulating the standards and procedures essential in this type of dental caries study—an action long delayed while quantitative means of measuring dental caries incidence were being slowly developed.

1. Report of the Committee on Standardization of Dental Examinations. J.A.D.A. 17:2143 Nov. 1930.
2. Deatherage, Charles F.; Wilson, Lawrence A., and Ledgerwood, Richard. Variability of routine diagnoses of dental defects in children of school age. J.A.D.A. 26:1739 Oct. 1939.

Civil Defense copes with civic disaster—enables Whiting to survive catastrophe

The industrial disaster which on the morning of August 27 broke over the city of Whiting, Indiana, and the effective manner in which it was handled point out to every thinking American the necessity of a Civic Disaster or a Civil Defense Program.

Just before the huge new gasoline-cracking tower—center of the 1,600 acre refinery—exploded, lower Lake Michigan dozed peacefully through the commonplace, unspectacular processing of Whiting's main industry—the cracking of oil. The next moment the lake and the land about it were wrapped in a sheet of flame and then battered by a barrage of steel and wood and stone. Further blasts followed and an umbrella of smoke blocked out the sun for days.

Fortunately the loss of life, most pitiful under any circumstance, was small in proportion to the loss of property. Two deaths were reported and a small boy lost a leg. Property loss to the oil company is estimated at from ten million to one hundred million dollars. Property loss to the city of Whiting is beyond immediate computation.

That no more were killed by the first blast was a matter of luck. But more than luck was responsible for keeping so low the subsequent personal injuries.

The reason is clear. Almost immediately after the initial explosion, Whiting threw into action its community war disaster program. The company guards and other personnel, the city and state police, the national guard, fire fighters from neighboring

communities and volunteers, including the city's business men, physicians and dentists knew what to do—did it—and did it well.

The point is that Whiting was prepared. Whiting, realizing its strategic military position, had long since perfected a Civil Defense Program—one which became—under these circumstances—a Civic Disaster Program.

Every American community could well take a leaf from Whiting's book. Certainly it is hoped that no American community ever will suffer the effects of atomic warfare, but experience has shown that few communities in this or other countries are immune against industrial accidents or the ravages of nature.

Whiting's experience is a concrete example of what Carl L. Sebelius, chairman of the Subcommittee on Civil Defense of the Association, means by his statement on page 466 of this issue. In concluding his report on "Operation Cue," the government's atomic demonstration held last spring in Nevada, Dr. Sebelius, impressed by the awesomeness of that spectacle, urges that "every effort be put forth to promote more interest among members of the dental profession in the role that they might play in the civil defense program of this country."

Whiting proved that it was not necessary to wait for war to go into community action. The citizens of Whiting were prepared, are yours?

Scientific program of the ninety-sixth annual session will summarize progress of dentistry

The scientific program to be presented at the ninety-sixth annual session of the Association in San Francisco measures up to the splendor of the fortune-favored host city. A cursory examination of the preliminary program published in the August issue of THE JOURNAL reveals how capably the Council on Scientific Session has carried out its task. Let the reader list the most important and interesting developments in dentistry in the past year, and he will find that each is the subject of a symposium or a panel discussion to be presented by authorities. No less interesting will be the essays presented in each of the eleven sections of the scientific session.

Members planning to attend the annual session are busy checking off the "musts" among the 135 table clinics listed in the preliminary program, and the 27 projected clinics (each of which will consist of a demonstration of a practical technic or of a solution of a particular problem commonly occurring in dental practice). The scientific exhibits, the current motion pictures scheduled for showing at San Francisco, and the presentations to be made by the 169 technical exhibitors top off the program. Many hundreds of men have spent countless hours in planning and preparation to assure that the scientific program will be an enriching experience for those who attend. Not without reason have these yearly scientific sessions been termed postgraduate courses in dentistry.

Practitioners will be doing themselves and their patients a favor by taking advantage of the opportunity to attend the San Francisco meeting and participate in its scientific sessions.

The American Dental Directory

Preparations for publication of the nineteen fifty-six edition of the *American Dental Directory* are in the final stage, according to the Directory and Membership Records Department of the Association. The book will be off the presses and in the mail by January 1 of the new year.

A modest news item on page 489 of this issue observes that the latest edition lists the names and addresses of more than ninety-six thousand dentists in the United States, with information on key dental personnel in each state, the requirements of state dental examining boards, the list of dental schools and the names and addresses of national dental organizations. Actually, the *Directory* merits a more extended report, for it is an outstanding publication in many respects.

The pending edition of the *Directory* is impressive because of its size alone. Its 1,200 pages rank it with publications of the scope of metropolitan phone books. In addition to listing dentists alphabetically, geographically and by specialties, the *Directory* lists educational institutions: dental schools in the United States, Canada and the Philippine Islands, dental hygiene schools, dental assistants schools and schools for dental laboratory technicians. It lists the officers, trustees, bureaus and councils of the American Dental Association and the principal officials of constituent dental societies. It contains basic information regarding state boards of dental examiners, state dental health divisions, specialty boards, national dental organizations in the United States (there are 45), and national dental organizations in 59 countries of the world. Dental specialists are listed geographically, as are honorary, associate and affiliate members of the Association residing in 42 countries. Additionally, the *Directory* lists the latest state-by-state requirements for dental licensure examinations. The pending edition of the *Directory* is the sixth, its predecessors being dated 1947, 1950, 1953, 1954 and 1955. Originally, editions were published at three-year intervals, with supplements being issued yearly to record the approximately 22,000 changes occurring annually in the listings. The increasing demand for the *Directory* prompted its more frequent appearance and has also increased the print run of each edition to its present 5,000.

Three-fourths of the total subscribers to the *Directory* are individual practicing members of the Association, who use the information therein for patient referral, to keep track of classmates and friends, and "just to study." Other categories of purchasers include constituent and component societies, governmental agencies, dental schools, hospitals, dental manufacturers, dealers and dental laboratories. The Association's councils and bureaus, almost without exception, also refer frequently to the *Directory* for statistical and other purposes, for it is the only complete, accurate and authoritative listing of dental manpower in the United States.

Although the *Directory* is compiled by the Directory and Membership Records Department, its production is a cooperative enterprise to which many of the councils and bureaus of the Association contribute.

Publication of the *Directory* is chiefly an Association service to its members. The nominal price ($6, prepublication, and $7.50, postpublication) does not begin to cover the cost of publication. Because of its completeness, accuracy, the range of its contents and its relatively low price, the annual *Directory* is a bargain service to the membership.

Washington News Letter

Three new members will take seats on the National Advisory Dental Research Council at the third and last of its 1955 meetings in October. They are J. Roy Doty of Chicago, Joseph F. Volker of Birmingham, Ala., and Edward Y. Blewett of Durham, N.H. Their appointments were announced recently by Leonard A. Scheele, M.D., Surgeon General of U.S. Public Health Service.

Established by act of Congress in 1948, the 12 member council considers and passes on research grant awards to dental schools, universities and other nonfederal institutions. Awards can be granted only on recommendation of the council.

The appointees will take the places of three members whose terms have expired: Alvin P. Black, Ph.D., of Gainesville, Fla., Francis J. Reichmann of Oklahoma City, and Mrs. Ethel G. Brown of Los Angeles.

Dr. Doty is secretary of the Council on Therapeutics, American Dental Association. In 1954 he received the Distinguished Alumni Award of Monmouth College, where he received his bachelor of science degree in 1927. He holds a Ph.D. degree in biochemistry from the University of Illinois.

Dr. Volker is dean of the school of dentistry and director of research at University of Alabama Medical Center. Prior to going to Birmingham, in 1948, he was professor of clinical dentistry and dean at Tufts. He is president-elect of the International Association for Dental Research.

Mr. Blewett is dean of the College of Liberal Arts, University of New Hampshire and a native of Yonkers, N.Y. He is a member of the executive committee of the New England Association of Colleges and Secondary Schools.

Research awards approved at the June meeting of the advisory council, and recently announced by Surgeon General Scheele, totaled $43,554 for seven new projects at six institutions. The group gave its endorsement also to 18 additional projects subject to future availability of funds.

SELECTIVE SERVICE CALL

In mid-September, Selective Service headquarters was awaiting final clearance by the government's executive branch of an Army requisition for dentists. It was reliably reported that the order would be for 119 special registrants and that December would be induction month. The dentists are wanted by the Army for military activation in February.

It is possible, though not probable, that the majority could be drafted from Priority I and Priority II rolls. Although Selective Service statistics as of July 31, the latest available, show that only 52 Priority I and II dentists are classified in 1-A and are physically acceptable, they also disclose that 122 I's and II's were holding essentiality deferments (2-A) which could be withdrawn at discretion of local draft boards.

Lucien A. Bavetta, Ph.D., professor of biochemistry at the University of Southern California School of Dentistry, has been appointed as a Visiting Scientist in the National Institute of Dental Research at Bethesda, Md. He will work in the laboratory of oral and biological chemistry, engaging in studies of dietary deficiencies in oral pathology.

The appointment is for one year, beginning September 12, 1955.

A native of Italy, Dr. Bavetta received a bachelor of science degree from New York University in 1930 and holds a Ph.D. in biochemistry and nutrition from the University of Southern California.

He is a member of the Greater Los Angeles Nutrition Council, International Association for Dental Research, Society for Experimental Biology and Medicine and Institute of Food Technologists.

Clemens V. Rault, dean of the School of Dentistry at Georgetown University, will continue to serve on the Veterans Administration Special Medical Advisory Group.

The VA recently announced abolition of its Council of Chief Consultants; the Council's functions are to be assumed by the Special Medical Advisory Group. Dr. Rault, who had been a member of the latter body, will remain on the reconstituted group, which has been enlarged by six members. Its membership now stands at 23.

NEW HEW UNDER SECRETARY

Washington observers believe that the new Under Secretary of Health, Education and Welfare Herold C. Hunt will play a prominent role in the shaping of policy and program dealing with the Department's health activities. This view is based on the fact that the staff position of Special Assistant for Health and Medical Affairs is still vacant, as well as Secretary Marion B. Folsom's statement that he intends to delegate much administrative authority to Mr. Hunt.

A professional educator, who served as general superintendent of schools in Chicago from 1947 to 1953, Mr. Hunt took the oath of office on September 12.

Secretary Folsom has given no indication when he will submit to President Eisenhower a recommendation for appointment of a successor to Chester Keefer, M.D., as his special medical adviser. Dr. Keefer resigned August 1 to return to Boston and give full time to teaching and administrative duties at Boston University School of Medicine and the Massachusetts Memorial Hospital.

International Correspondence

NEWS FROM THAILAND

On July 14, 1955, the Faculty of Dentistry, Bangkok, Thailand, held an inauguration ceremony for the new dental clinic building and the new dormitory which had just been completed at the cost of about $200,000 and $50,000 respectively. The new dental clinic building houses the surgical, operative, roentgenology and orthodontic departments. Modern equipment has been installed throughout. Part of this equipment has been furnished through FOA aid. The clinic will make possible the care of a greater number of patients.

On the occasion of the inauguration, the Faculty of Dentistry, which was founded 15 years ago, held its first alumni convention. Lectures were given on some of the latest technical developments in dentistry and an exhibition of dental products was held. Over 300 dentists from all over the country attended.

The Faculty of Dentistry, University of Medical Science, under the auspices of the Ministry of Public Health, Bangkok, Thailand, started to function in 1940 as a department in Chulalongkorn University. Marshal Pibulsongkram was then rector of the University. In 1943, this department was turned into a faculty of the University. Owing to the exigencies of World War II, the faculty had to move to several locations, but since the war's end, it is permanently located at Race Course Road, Patumwan, Bangkok.

The course of study covers a period of six years, the first four years preclinical and the last two clinical. Since its foundation, the faculty has turned out 90 dental surgeons. At the moment, there are altogether 60 undergraduates and 35 dental hygienists in the school.

C. Ratanaphaisal

NEWS FROM GREAT BRITAIN

Courses in the basic medical sciences are arranged by the Faculty of Dental Surgery of the Royal College of Surgeons, writes Professor Stones. These are of eight weeks' duration and are given by the Institute of Basic Medical Sciences in the College in London. They consist of practical demonstrations in anatomy, applied physiology and pathology in relation to dental surgery, and in dental anatomy and histology. The courses which are held twice yearly are particularly valuable for dentists preparing for the primary examination of the F.D.S., R.C.S.

The chief center for postgraduate training in clinical dental subjects is the Institute of Dental Surgery, Eastman Dental Hospital, London. The Institute is the only establishment in Great Britain that is devoted solely to postgraduate dental studies.

The most important course given is one of eight months' duration held twice yearly. This course is suitable for candidates preparing for the final F.D.S., R.C.S. examination. It includes lectures, clinical demonstrations and practical work in the various aspects of clinical dentistry including roentgenology. Arrangements are made for attendance at a general hospital and visits to centers for maxillofacial work.

The Institute also provides postgraduate dental programs lasting for six or 12 months in orthodontics and certain other subjects and short courses in specialized subjects as well as general refresher courses.

At Edinburgh, the Postgraduate Board of Medicine is now arranging an eight weeks' course in applied anatomy, physiology, pathology, bacteriology and biochemistry suitable for candidates studying for part 1 of the F.D.S. examination.

The undergraduate dental schools vary in the facilities that are offered for postgraduate education proper, and it is unusual to find systematic courses of instruction covering six to 12 months in specific subjects. This lack probably is due firstly to the shortage of teachers, which requires them to devote the major part of their time to undergraduate teaching, and secondly to the few applicants for such courses. Short courses covering about ten meetings of the class are sometimes given in a special subject such as orthodontics.

Many schools offer facilities for attendance for a month or longer in the various clinical departments and will do their best to meet the individual needs of an applicant.

Another method of obtaining postgraduate clinical training is provided by registrar appointments which are part of the hospital service and are paid by the Ministry of Health. These appointments, made for a year, are open to renewal for several years. Usually a registrar undertakes general duties in a dental hospital and does not confine his activities to one subject. Sometimes the appointment is for a specific subject such as orthodontics. If it is in oral and maxillofacial surgery, the appointment may be held at a maxillofacial center. Senior registrar appointments are comparatively few in numb .. A post of this nature is sought after by a registrar who wishes eventually to become a specialist in either of the previously mentioned subjects.

Dentists who treat National Health Service patients are encouraged by the Ministry of Health to attend refresher courses, and the Ministry pays the cost. Various dental schools have arranged these courses which are taken usually either as an intensive one week's study or with a half day's attendance spread over a number of weeks. The coverage is wide, and hence the time devoted to each subject correspondingly brief.

NATIONAL HEALTH SERVICE

The Ministry of Education after consultation with the Ministry of Health has sent a circular to all local education authorities about the provision of orthodontic treatment. The proposal envisages close cooperation between hospital and specialist service and the school dental service. It is the duty of all local education authorities to provide a comprehensive system of free dental treatment for children, and this includes the provision of orthodontic treatment.

The circular emphasizes the hope of the Minister that every effort will be made to provide facilities for orthodontic treatment as quickly as other considerations, such as the demand for ordinary conservative treatment, permit. The suggestion is made that cases of moderate complexity be referred to a specialist orthodontist who prescribes courses of treatment to be carried out under his supervision by school dental officers. This would enable the service of a specialist to be made available to a greater number of children, always providing the school dental staff is sufficient to undertake the additional orthodontic work. This proposal, of course, does not suggest that the most complex orthodontic cases which require considerable experience and a high degree of skill in treatment should be dealt with by any but consultant specialists in orthodontics provided by the Regional Hospital Board.

This action by the Ministries brings the importance of orthodontic treatment to the fore and is another step in the right direction of providing a real preventive dental service for children—and at the same time encouraging the further study of orthodontics by our younger colleagues.

The following figures were given about orthodontic treatment in the National Health Service excluding hospital service.

	Courses of orthodontic treatment approved	Installments of payment made £
1948	3,500	
1949	12,000	
1950	20,000	300,000
1951	25,000	
1952	34,000	250,000
1953	41,000	400,000
1954	48,000	500,000

About 40 per cent of all the courses approved are still in progress. Interim payments are made as the courses proceed.

SCHOOL DENTAL SERVICE

In the School Dental Service the number of dentists dropped to 800 after the introduction of the National Health Service, but it now stands at more than 1,100. Figures of treatment given emphasize the preventive aspect of the work being done. In 1951 approximately two and half million dentures were supplied. That figure fell to one and a half million in 1954. The number of courses of conservative treatment had, however, in the same time, risen from four and a half million to nearly six million. The emphasis was on saving teeth instead of supplying dentures.

The suggestion was made that the integration of dentists in private practice with the local authority service should be encouraged —not for actual dental service but for dental health education.

The Minister of Health gave the following information relating to the cost of the general dental services.

Period	General Dental Services £m
England and Wales	
July 5, 1948, to Oct. 31, 1951	121.291
Nov. 1, 1951, to Mar. 31, 1955	78.024
Scotland	
July 5, 1948, to Oct. 31, 1951	15.943
Nov. 1, 1951, to Mar. 31, 1955	8.970

ITEMS OF INTEREST

In the elections to the Board of the Faculty of Dental Surgery the following were elected: Prof. F. C. Wilkinson, dean, re-elected; Sir William Kelsey Fry, re-elected; Mr. Alan Shefford, re-elected, and Mr. R. Cocker, elected.

Prof. Ernest Matthews of the Turner Dental School, University of Manchester, is at present in South Africa delivering a series of lectures on prosthetics.

Prof. Robert Bradlaw, dean of the Sutherland Dental School, University of Durham, also will be visiting South Africa in September to give a series of lectures under the auspices of the University Students Visiting Lecturers Trust Fund.

Gerald H. Leatherman,
D.M.D., F.D.S.R.C.S.

NEWS FROM ARGENTINA

A number of professional men from various countries have been invited to appear on the program of the Twelfth Jornadas de la Asociación Odontológica Argentina which will be presented at Buenos Aires November 7-9.

Charles Berger of New York recently visited Buenos Aires. He gave courses in the Facultad de Odontologia, Círculo Odontológico del Oeste and the Institución de Prótesis Clínica. He gave clinics on patients and aroused great interest because he speaks excellent Spanish. When a clinician speaks Spanish, the dentists are greatly interested in hearing him. It is true that there are many in our profession who can translate the lectures, but when the speaker can converse in our language, this is to be preferred. We look forward to the visits of other teachers from the United States.

Ricardo Augusto Crespi,
Journal correspondent from Buenos Aires

TRUSTEES REVIEW ASSOCIATION'S ACTIVITIES; NAME COUNCIL CONSULTANTS AND EXECUTIVE OFFICERS

A wide range of matters affecting dentistry came before the Board of Trustees at its meeting September 8-10 in Chicago. The Trustees reviewed the reports of officers and Association councils on their activities during the past period, discussed progress of the headquarters construction program and appointed executive officers and council consultants. Recommendations of the Trustees on questions ranging from expected Congressional action on health matters to programs to be sponsored by the Association will be presented by the Board to the House of Delegates when the House meets in annual session in San Francisco later this month. The Board will meet again October 12, just prior to the annual session.

HILLENBRAND REAPPOINTED

Harold Hillenbrand, secretary, and H. B. Washburn, treasurer, whose terms expire this year, were reappointed. Dr. Hillenbrand's appointment is for a three year term; Dr. Washburn's for one.

COUNCIL CONSULTANTS

Consultants approved for the Council on Dental Health to serve until the 1956 annual session were:

Paul Boyle, professor of oral histology and pathology, University of Pennsylvania; Kenneth A. Easlick, professor, School of Dentistry, University of Michigan; Donald J. Galagan, assistant chief, Division of Dental Public Health, U.S. Public Health Service; T. M. Graber, associate professor of orthodontics, Northwestern University Dental School; Irving R. Hardy, professor of prosthodontics, Tufts University School of Dental Medicine; Raymond E. Johnson, periodontist of St. Paul; Robert G. Kesel, professor of applied materia medica and therapeutics, College of Dentistry, University of Illinois; Maury Massler, professor of pedodontics, College of Dentistry, University of Illinois; Donald H. Miller, lecturer on practice management of Elmira, N.Y.; Isaac Schour, dean, College of Dentistry, University of Illinois; Nina Simmonds, Sc.D., associate clinical professor of nutrition and preventive medicine, University of California, and Gerald D. Stibbs, professor of operative dentistry, School of Dentistry, University of Washington.

Approved as consultants for the Council on Federal Dental Services were:

Thomas P. Fox and James P. Hollers, members of the advisory committee to the Assistant Secretary of Defense, and Harold W. Oppice, recently appointed member of the Health Resources Advisory Committee. Russell W. Bunting was named consultant to the Subcommittee on Civil Defense.

The Board approved the following as consultants for the Council on Dental Education:

O. M. Dresen, dean, School of Dentistry, Marquette University; Roy G. Ellis, dean, the Dental School, University of Toronto; Maynard K. Hine, dean, School of Dentistry, Indiana University; Gustav O. Kruger, Jr., head of the department of oral surgery, School of Dentistry, Georgetown University; Raymond J. Nagle, dean, College of Dentistry, New York University; Ray V. Smith, head of the department of crown and bridge, College of Dentistry, State University of Iowa; Paul Stough, chairman of the National Board of Certification of Dental Laboratory Technology, National Association of Dental Laboratories; Margaret Swanson, executive secretary, American Dental Hygienists Association, and George W. Teuscher, dean, Northwestern University Dental School.

Consultants appointed to the Council on Dental Research were:

Wallace D. Armstrong, M.D., University of Minnesota, (medical aspects of fluoridation); Herbert D. Ayers, Jr., Flushing, N.Y., (dental materials); Harold C. Hodge, Ph.D., University of Rochester, (biochemistry); Seymour J. Kreshover, D.D.S., M.D., Ph.D., School of Dentistry, Medical College of Virginia, (pa-

thology); Miles R. Markley of Denver, (dental materials); Harold J. Noyes, dean, The Dental School, University of Oregon, (growth and development-orthodontics); Ralph W. Phillips, School of Dentistry, Indiana University, (dental materials); Reidar F. Sognnaes, Ph.D., L.D.S., Harvard University School of Dental Medicine, (animal experimentation), and W. Ward Wainwright, D.D.S., M.S., School of Dentistry, University of Southern California, (radiation and biophysics).

Appointed as consultants for the Council on Dental Therapeutics were:

Mary C. Crowley, M.S.P.H., University of Michigan School of Dentistry, (bacteriology); Harrison Flippen, M.D., University of Pennsylvania Graduate School of Medicine, (antibiotics); Wendell H. Griffith, Ph.D., professor of psysiological chemistry, Medical School, University of California, (nutrition); S. C. Harris, Ph.D., chairman, department of physiology and pharmacology, Northwestern University Dental School, (physiology and pharmacology); Walter C. Hess, Ph.D., professor of biological chemistry and head of the department, Georgetown University School of Dentistry, (biological chemistry and nutrition); William Lefkowitz, associate professor of dentistry, Ohio State University School of Dentistry, (histology); F. J. McClure, Ph.D., National Institute of Dental Research, (nondental effects of fluoride), and Edward Sleeper, associate professor of oral surgery, Tufts University School of Dental Medicine, (oral surgery).

JOURNAL OF ORAL SURGERY

Other appointments made by the Trustees were to the editorial board of the *Journal of Oral Surgery*. Serving for three year terms are:

James Hayward, director, department of oral surgery, University of Michigan School of Dentistry; P. E. Williams, Dallas, Texas; Fred A. Henny, head, division of oral surgery and dentistry, Henry Ford Hospital, and editor of the *Journal of Oral Surgery*, and Sanford A. Moose, clinical professor of oral surgery, School of Dentistry, College of Physicians and Surgeons.

HOSPITAL DENTAL SERVICE

The Trustees authorized the Council on Hospital Dental Service to cooperate with the American Hospital Association for the initiation of a series of institutes on hospital dental service. Designed to improve understanding of the role of the dentist on the hospital staff, the institutes would be open to dentists, physicians and hospital administrators. Each year the American Hospital Association sponsors about 60 such institutes on various aspects of hospital practice. It is expected that the first dental institute would be held in the spring of 1956.

COMMITTEE ON TELEVISION

Members of the Special Committee on Television, appointed by President Lynch at the March meeting of the Board of Trustees, submitted four resolutions which were approved by the Trustees. The resolutions provide that the Association's program in television should consist principally of assisting constituent and component societies in the development of their own television programs. The Association will prepare television scripts and slides and a manual on the use of television for the societies.

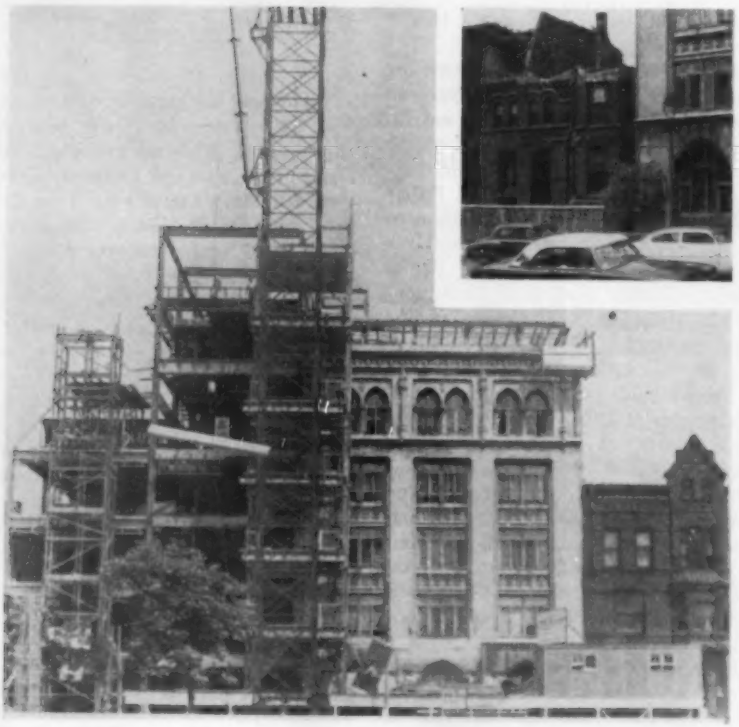
1957 ANNUAL SESSION

In an additional action, the Board approved the nomination of A. W. Kellner of Hollywood, Fla., as General Chairman of the General Committee on Local Arrangements for the 1957 annual session in Miami.

BOARD MEMBERS PRESENT

All officers and members of the Board of Trustees attended the meeting. Officers present were:

Daniel F. Lynch of Washington, D.C., president; Bernerd C. Kingsbury of San Francisco, president-elect; Curtis A. Haggard of Miami, Fla., first vice-president; Frederick W. Herbine of Reading, Pa., second vice-president; John E. Fauber of Washington, D.C., third vice-president; Harry Lyons of Richmond, Va., speaker of the House of Delegates; Harold



Completion of the new section of the Association's Central Office is expected by the end of this year. June 1956 is completion date for the entire building program. Brick work on the addition was under way in September. A year ago demolition had just begun (inset).

Hillenbrand of Chicago, secretary; C. Willard Camalier of Washington, D.C., assistant secretary; Louis M. Cruttenden, assistant secretary; H. B. Washburn of St. Paul, treasurer, and Lon W. Morrey of Chicago, editor.

Trustees attending the meeting were:

John R. Abel of Beverly Hills, Calif., Thirteenth District; William R. Alstadt of Little Rock, Ark., Twelfth District; Percy T. Phillips of New York, Second District; Clarence S. Renouard of Butte, Mont., Eleventh District; Howard B. Higgins of Spartanburg, S.C., Fifth District; L. H. Jacob of Peoria, Ill., Eighth District; Paul H. Jeserich of Ann Arbor, Mich., Ninth District; Charles H. Patton of Philadelphia, Third District; Edward R. White of Jersey City, Fourth District; Earl G. Jones of Columbus, Ohio, Seventh District; A. F. Schopper of Kansas City, Mo., Sixth District; Charles I. Taggart of Burlington, Vt., First District, and Lewis W. Thom of Minneapolis, Tenth District.

J. ROY DOTY SELECTED FOR NATIONAL ADVISORY COUNCIL

J. Roy Doty, secretary of the Association's Council on Dental Therapeutics, has been appointed to serve on the National Advisory Dental Research Council. The appointment, effective October 1, was made by Surgeon General Leonard A.

Scheele, M.D., of the U. S. Public Health Service.

As a member of the National Advisory Council, Dr. Doty advises the Surgeon General on activities of the National Institute of Dental Research, one of the seven National Institutes of Health, main research organizations of the U. S. Public Health Service. On recommendation of the Advisory Council, the Surgeon General awards grants to universities, dental schools and other nonfederal institutions conducting research on diseases of the mouth and teeth.

Dr. Doty came to the American Dental Association's Council on Dental Therapeutics in 1943. Previously he was on the faculty of the Louisiana State University School of Medicine in New Orleans. He holds a B.S. degree from Monmouth College, Monmouth, Ill., and a Ph.D. in biochemistry from the University of Illinois. In 1954, Dr. Doty received the Distinguished Alumni award of Monmouth College. He is the author of many scientific articles.

Also appointed to the Council were Joseph F. Volker of Birmingham, dean of the School of Dentistry, University of Alabama Medical Center, and Edward Y. Blewett, dean, College of Liberal Arts, University of New Hampshire.

An additional appointment made by the U.S. Public Health Service was that of Lucien A. Bavetta of Los Angeles, Calif., to serve as visiting scientist in the National Institute of Dental Research. Dr. Bavetta will do research on the relation of certain dietary deficiencies to the development of diseases of the teeth.

COUNCIL DENIES SUPPORT FOR A FLUORIDE TABLET

The name of the Council on Dental Therapeutics has been used in an unauthorized manner in recent advertising letters which advocate the purchase of Karidium Tablets, a fluoride preparation.

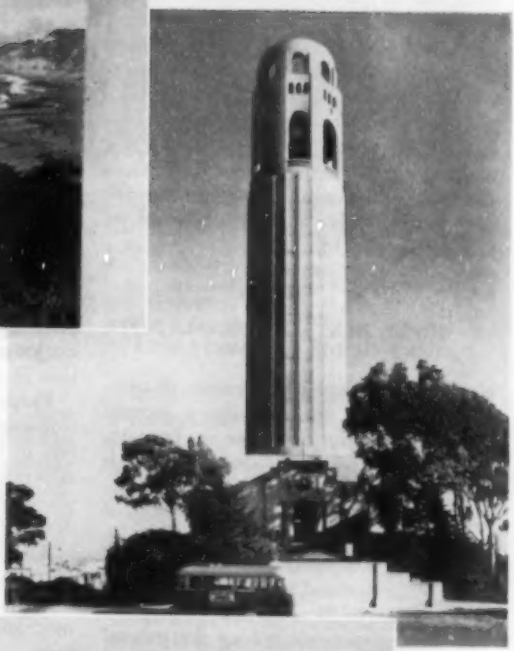
In a statement setting forth the Council's position, J. Roy Doty, Council secretary, said, "Neither has the Council on Dental Therapeutics accepted Karidium Tablets nor has the Council given tacit approval to the advertising claims for the product. . . . Difficulties in the effective use of fluoride tablets and similar preparations are noted in the Council's report on the status of the dental uses of fluorides (J.A.D.A. 45:468-469 Oct. 1952). A further report on prescribing fluorides for individual use is being prepared by the Council and will be published in THE JOURNAL."

EDITORS TO MEET IN CIRQUE ROOM OF FAIRMONT HOTEL

Among meetings scheduled for San Francisco just prior to the Association's 96th annual session October 17-20 is the Conference on Dental Journalism, a joint project of the Council on Journalism and the American Association of Dental Editors. The Conference, previously announced for the San Francisco Room of the Fairmont Hotel, will be held instead in the Cirque Room of the Fairmont Hotel (afternoon session) and in the Gold Room (evening session). Date of the Conference is October 15.

The 96th annual session of the American Dental Association is expected to be one of the largest meetings in the Association's history. Some 66 hotels will house convention visitors, who in addition to attendance at the scientific session and the House of Delegates meetings, will visit places of interest in this cosmopolitan city. The Golden Gate Bridge, facing page, above, is a major attraction. The center picture shows Coit Tower on Telegraph Hill, a memorial to the volunteer firemen of San Francisco's early history. Inside the tower are murals by many artists depicting California industry. Lower picture: An aerial view of downtown San Francisco includes both bridges.

AMERICAN
DENTAL ASSOCIATION
ANNUAL SESSION
SAN FRANCISCO
OCTOBER 17-20



HERZ REPRESENTS ASSOCIATION AT MEXICO CITY CONGRESS

Francis J. Herz, chairman of the General Committee on Local Arrangements for the San Francisco meeting, will officially represent the American Dental Association and the Fédération Dentaire Internationale at the Third Dental Congress of the Mexican Dental Association October 23-28 in Mexico City. Association members have been invited to the meeting which immediately follows the Association's annual session. Individuals interested in attending the Mexico City meeting should write Robert Ruff, vice-president of the organizing committee for the meeting, whose address is Insurgentes 257, Mexico 7, D.F.

WORLD DENTAL JOURNALS NOTE START OF DENTAL ABSTRACTS

News of the coming publication of DENTAL ABSTRACTS, the Association journal appearing for the first time in January, has been carried in dental journals around the world. Wide readership of the magazine, which will carry abstracts of articles from dental and allied health periodicals, is assured as already close to 5,000 subscriptions have been received from persons in 24 countries.

A mailing piece describing the journal and inviting charter subscriptions was mailed in early October to 85,000 practicing dentists, researchers, schools and other institutions in this country and abroad. The four page brochure reproduced the cover of the new magazine, sample abstracts, a montage of abstracts to show the wide range of subjects covered, and described the publication's scope and purpose.

"DENTAL ABSTRACTS will provide in short form information on the latest developments in dental science and dental practice from all over the world," stated Lon W. Morrey, Association editor. "In addition, the Association library will carry the magazines from which the abstracts are taken so that a reader who wishes to see the entire article may do so."

The annual subscription price is $6 in the United States; $7 outside the country. Subscriptions may be obtained from the Subscription Department at the Association's Central Office in Chicago.

DISTRIBUTE RATE AND DATA BOOK FOR STATE JOURNALS

The first annual volume of rates and data information on all state dental journals has been published by the American Dental Association and mailed to the more than 400 manufacturers and advertising agencies on the Association's mailing list. The new publication, entitled *Rates and Data, State Dental Journals,* was compiled by the Association for the Council on Journalism and the American Association of Dental Editors.

Purpose of the volume, as stated in the foreword, is "to arouse advertisers' interests in the state journals as worthwhile advertising media and to facilitate the placement of contracts and insertion orders with state dental journals."

All the information essential to an advertising program is contained in the publication, including rates, circulation, mechanical requirements and special features.

Copies of the publication may be obtained from John J. Hollister, business manager, American Dental Association, 222 E. Superior St., Chicago 11.

MISS GEORGIA KRAUSE JOINS CENTRAL OFFICE STAFF

Miss Georgia Krause of Chicago has been appointed supervisor of the Association's Membership Department, succeeding Mrs. Frances Lyons who resigned July 15. Miss Krause's appointment was announced August 24. Prior to the appointment, she worked ten years for George

Fry and Associates, management consultants, where she was supervisor of report writing. She is a graduate of Metropolitan Business College and studied office administration at Northwestern University.

SAMUEL T. MAYO RESIGNS FROM CENTRAL OFFICE STAFF

Samuel T. Mayo, director of the Division of Educational Measurements of the Council on Dental Education, resigned in mid-September, it was announced by Harold Hillenbrand, Association secretary. Mr. Mayo has been named instructor in education at Loyola University (Chicago). No successor to Mr. Mayo has been named as yet.

FILM LIBRARY ANNOUNCES NEW PRICES FOR SLIDES

Color slides ordered from the American Dental Association have been reduced in price from $1.10 to $1.00, according to Helaine Levin, film librarian. In addition, Miss Levin states, there no longer is a 10 per cent handling charge for slides. Slides may be obtained from the Order Department at the Central Office.

GEORGE PAFFENBARGER PROMOTED TO REAR ADMIRAL

George C. Paffenbarger, American Dental Association Senior Research Associate at the National Bureau of Standards and formerly a commodore in the Dental Corps of the Naval Reserve, was promoted to the grade of rear admiral August 31. He received his appointment in the office of Rear Admiral R. W. Malone, (DC) USN, chief of the dental division, Bureau of Medicine and Surgery, in Washington, D. C.

Admiral Paffenbarger was first appointed a lieutenant commander in the Dental Corps of the U. S. Naval Reserve in 1940. He advanced to the rank of commander in 1942 and to the rank of captain in 1945. Late in 1945 he became the first dental officer to hold the rank of commodore.

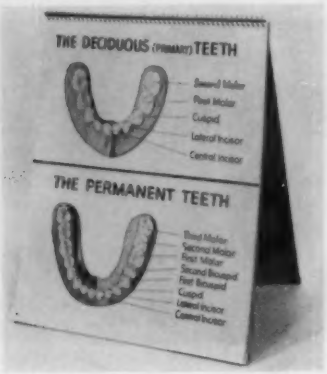
Commodore George C. Paffenbarger, (DC) USNR, (right) was promoted to the grade of Rear Admiral in the Naval Reserve August 31. Admiral R. W. Malone, (DC) USN, chief of the dental division, Bureau of Medicine and Surgery, presents the new flag officer with his appointment.

Admiral Paffenbarger is an internationally known dental research authority.

BUREAU PUBLISHES SPEAKER'S GUIDE AS AID TO DENTISTS

The dentist who has to make a talk before the public will now find his task made easier as a result of a new publication of the Bureau of Dental Health Education. *Handbook for Dentists—A Speaker's Guide* contains ideas on what to talk about, pointers on preparation and delivery of a speech, facts to include and 20 flip charts to serve as illustrations. Material in the *Handbook* has been keyed to the charts so that the dentist may see easily which charts appropriately illustrate his speech. The *Handbook* is particularly recommended to the speakers' bureaus of component societies.

Information is grouped according to its



The Speakers Flip Chart, containing 20 charts 15 x 19½ inches suitable for illustrating dental health talks, has been prepared by the Bureau of Dental Health Education. A self-contained easel makes it possible to stand the charts on a table for easy audience viewing. The charts are suitable for use on television also.

suitability for speeches before school children, teachers' groups, PTA's and other community organizations. Subjects covered are the needs for dental health care and the resources available to meet those needs, dental caries, periodontal disease, orthodontics, diet and dental health and fluoridation. In addition, the publication contains facts on school and community dental health programs, lists sources for further information and contains a section of "quick facts" and common "fallacies and facts."

The flip charts included in the *Handbook* may be ordered separately in an enlarged size (15 x 19½ inches) suitable for showing to large groups or for use on television. The charts are available for $4, the *Handbook* for $2 from the Order Department at the Central Office.

RARE BOOK BY ETIENNE BOURDET GIVEN ASSOCIATION

A rare copy of Etienne Bourdet's *Recherches et Observations,* in the 1786 edition, was presented recently to the American Dental Association. The book was given to Harold Hillenbrand, Association secretary, August 17 at the French Embassy. Jean Deliberos made the presentation on behalf of Maurice Brenot, the donor.

Etienne Bourdet (1722-1789) is considered to be, next to Pierre Fauchard, the most distinguished French dentist of the eighteenth century. In his book, first published in 1757, he introduced some technical methods superior to those of Fauchard. He regarded his own book as a supplement to Fauchard's. Bourdet was probably the first to give directions for performing a gingivectomy in instances of periodontitis.

TRUTH ON DENTIFRICES TOLD IN LEAFLET

Don't Be Misled—Choose Your Dentifrice Wisely is the title of a brown and white leaflet on dentifrices just published by the Bureau of Dental Health Education. Designed to aid the dentist in telling his patients the facts about dentifrices, the leaflet says, "The function of a dentifrice . . . is to aid the brush in cleaning the teeth. Don't be misled by [advertising] claims. These claims have not been proven."

Meanwhile, advertising claims of major dentifrice manufacturers were being refurbished, this time with fluorides as copy ammunition. The August 13 issue of *Tide* magazine reported that "fluoride" dentifrices are currently being test-marketed by Procter and Gamble, Block Drug Company, and Lambert Company in preparation for an all-out advertising war.

Copies of the Association's new dentifrice leaflet may be ordered from the Order Department at the Central Office at the following prices: 25 copies, 40 cents; 50 copies, 75 cents; 100 copies, $1.35; 500 copies, $5.80.

ASSOCIATION ISSUES PAMPHLET ON TOOTH DECAY

Tooth Decay—What To Do About It, a ten page pamphlet prepared by the Bureau of Dental Health Education, explains the role of the dentist, the individual and the community in the prevention of dental caries. A revision of an earlier pamphlet entitled *Dental Caries—Prevention and Control,* the new publication explains what dental caries is, urges early and frequent dental examination, treatment of cavities, oral hygiene measures, cutting down on sweets in the diet and fluoridation. It is attractively printed in dark blue ink on white paper.

Tooth Decay—What To Do About It may be obtained from the Order Department at the Central Office at the following prices: 25 copies, 90 cents; 50 copies, $1.30; 100 copies, $2.25.

LIST 90,000 DENTISTS IN AMERICAN DENTAL DIRECTORY

More than 90,000 dentists will be listed in the 1956 edition of the *American Dental Directory,* which will be available December 15. Dentists are listed both alphabetically and geographically. In addition to the dentist's name and address, the *Directory* will show type of practice, school and year of graduation, membership or nonmembership in the Association and, in most instances, the year of birth. The reference section in the front of the book includes a list of specialists, dental schools, national dental organizations and requirements of the State Boards of Dental Examiners.

The prepublication price—for prepaid orders received before October 20—is $6 a copy. Orders received after October 20 will be filled at the regular price of $7.50. Copies of the *Directory* may be obtained from the Order Department at the Central Office.

SUBSCRIPTS • A tour designed especially for photography enthusiasts has been added to the entertainment program planned for the 96th annual session in San Francisco, announces Francis J. Herz, chairman of the Local Arrangements Committee. . . . Mimeographed copies of the San Francisco film program, which contains films available from sources other than the Association, may be obtained from the Film Library at the Central Office. . . . The conference on dental health care programs for organized groups, tentatively scheduled for December by the Council on Dental Health, will be held instead early in 1956. . . . *Clinical Testing of Dental Caries Preventives,* the report of the Conference to Develop Uniform Standards and Procedures in Clinical Studies of Dental Caries has been published. The Conference, held in 1953, was cosponsored by the Councils on Dental Health, Dental Research and Dental Therapeutics.

Dental Societies

400 MAINLANDERS TO ATTEND PAN-PACIFIC MEETING

More than 400 reservations have been received from the mainland for the Pan-Pacific Dental Conference of the Honolulu County Dental Society scheduled for October 24 and 25 in Hawaii, immediately after the American Dental Association's annual session. The Conference has been designed to combine extensive social events with the scientific program. Persons wishing to register for the Conference may write to Pan-Pacific Dental Conference, 3124 E. 14 St., Oakland 1, Calif.

Daniel F. Lynch (second from right), president of the American Dental Association, was guest of honor at the dinner meeting of the Sunmount Veterans Administration Hospital and the Adirondack Dental Society, at Tupper Lake, N. Y., August 13. With Dr. Lynch are (l. to r.): Percy T. Phillips, Second District Trustee; J. W. Martin, vice-president, Dental Society of the State of New York; Herbert L. Taub, president-elect of the State society; Charles A. Wilkie, its secretary; Charles I. Taggart, First District Trustee, and Carlisle Bastian of New York.

COLOR TV A FEATURE OF NEW YORK MEETING

Closed circuit color television will be a feature of the Greater New York Dental Meeting December 5-9 at the Hotel Statler in New York. The contributions of the various areas of the profession, such as periodontics, endodontics, and restorative dentistry, to the chairside dental practice of the family dentist, will be presented. Some 60 speakers and clinicians are on the program, which includes projected clinics, table clinics, topic discussions and limited attendance clinics. Information on the meeting may be obtained from the executive secretary, Mrs. Mabel Purdy, Suite 106 A, Hotel Statler.

SOCIETY ACTS TO PREVENT FOOTBALL TOOTH INJURY

When the Huntington (W.Va.) High School football team took the field against the Bluefield gridders September 10 no one was worried about possible lost or chipped teeth. For the first time, all Huntington players wore mouth protectors, made by members of the Huntington Dental Society.

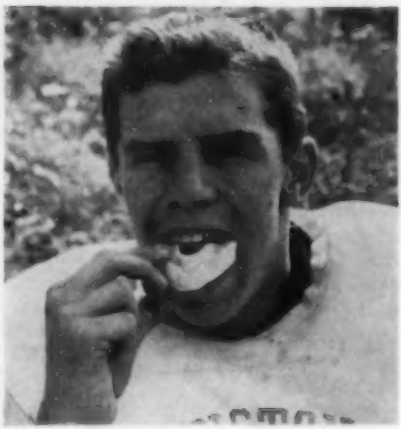
The use of mouth protectors by the team came as the direct result of an intensive public education program of the dental organization. After the success of two years of Children's Dental Health Week activities in local schools, the Huntington society expanded its activities with a weekly TV program. The first three

The Ohio State Dental Association will meet November 13-16 in Cleveland. It is the Association's 90th annual meeting. Looking over the program are (l. to r.): Herbert J. Hoppe, Association president; Ralph E. Creig, vice-chairman, local arrangements committee; Harry J. Gaurink, general chairman, local arrangements committee, and Carl J. Stark, treasurer, local arrangements committee.

programs dealt with routine dental care and the fourth discussed the football season.

A popular high school quarterback appeared on the program wearing a mouth protector. The dentist on the program quoted statistics on mouth injuries resulting from contact sports. Fast action from parents and football enthusiasts followed. Within a month, the entire team was equipped. Other schools in the component society's territory are now planning to provide mouth protectors for their players.

Elsewhere in the nation, similar action was taken. The Baldwin, Long Island, N. Y., High School team started the September season equipped with flexible rubber mouth protectors donated by the Nassau County Dental Society. Earlier, the New Britain (Conn.) society provided mouth guards for the local school team.



A Huntington (W.Va.) High School football player tries on his mouth protector, made by a member of the Huntington Dental Society.

Dental Education

INDUSTRIAL TV SYSTEM INSTALLED IN TEXAS SCHOOL

Teaching by television is under way at the new dental school of the University of Texas at Houston. Under a built-in industrial television system 50 rooms, each accommodating four students, have 17 inch television monitors on which students can follow the instructor at close range. Questions may be asked by use of a microphone; a cue lamp indicates to the instructor that a question has been asked. The questions and answers are heard in all the rooms.

Teaching aids used by the instructor are reproduced on the TV screens. As a result of the TV system, fewer instructors are required for a given number of students than formerly. Conference rooms and lecture halls at the dental school also are equipped for television teaching.

SCHOOLS SCHEDULE REFRESHER AND SPECIALTY COURSES

Indiana • The Indiana University School of Dentistry has published its 1955-56 schedule of postgraduate courses. Included in the list are classes in newer dental materials, veneered gold and jacket crown technics, high speed cavity preparation and pulp reaction, oral lesions, pedodontics and oral surgery. Information on the courses may be obtained from the school in Indianapolis.

Washington • A one day course in the etiology and diagnosis of facial pain of dental origin is offered November 2 by the University of Washington School of Dentistry in Seattle. Harry Sicher, M.D., of Chicago, is the teacher. One lecture period will be devoted to temporomandibular joint disorders; the second period will cover differential diagnosis of other facial pain. Participants will be encouraged to present for discussion special problems encountered in their practices.

In addition, the school has announced a refresher course in hydrocolloid indirect tech-

nic October 29-31. Instructors are Morris J. Thompson of Beverly Hills, Calif.; William H. Hagen and Cecil F. Lindley of Seattle.

INTERNSHIP, RESIDENCY OFFERED BY ALABAMA SCHOOL

The University of Alabama School of Dentistry and the University Hospital offer a one year internship in oral surgery as part of a three year program leading to Board eligibility in oral surgery. An assistant residency is offered also by the hospital and school, in conjunction with the Veterans Administration Hospital in Birmingham.

Information on both programs may be obtained from Joseph P. Lazansky, M.D., associate dean, University of Alabama School of Dentistry, Birmingham 3, Ala.

THOMAS E. PURCELL, FORMER DENTAL DEAN, DIES

Thomas E. Purcell, former dean of St. Louis University School of Dentistry, died August 22 after surgery for a heart ailment. He was 81 years old.

T. E. Purcell

Dr. Purcell became dean of the St. Louis school in 1933 and remained in that capacity until 1945. He was retired at the time of his death. Dr. Purcell was a graduate of Kansas City Dental College. In addition to his dental degree, he held an honorary doctor of laws degree from St. Mary's College in St. Marys, Kan. During his career he served as president of the Kansas City District Dental Society and was a Fellow of the American College of Dentists.

HOWARD MARJERISON, FORSYTH DENTAL DIRECTOR, DIES

Howard Mitchell Marjerison, director of the Forsyth Dental Infirmary for Children, died suddenly at his summer home

H. M. Marjerison

in Chatham, Mass., September 4. He was 60 years old. A distinguished educator, Dr. Marjerison during his career served as dean of two dental schools, taught and wrote extensively on aspects of dental education. He was also an active member of many academic and professional organizations.

After graduation from Tufts College Dental School in 1916, Dr. Marjerison was appointed to the first intern staff of the then newly established Forsyth Dental Infirmary for Children. A year later he was appointed instructor in prosthetic dentistry at Tufts College Dental School and advanced to the rank of full professor. In 1934 he was appointed dean of the school, in which capacity he served until 1940.

In 1940 he went to the University of Illinois College of Dentistry as dean and professor of dentistry. In 1944 he re-

turned to Boston to become associate director of the Forsyth Infirmary. In 1950 he became director. Dr. Marjerison was instrumental in bringing about the recent affiliation of the Infirmary and the Harvard School of Dental Medicine.

At the time of his death, Dr. Marjerison was lecturer on pediatric dentistry at the Harvard School, a trustee of Forsyth, a member of the committee on dentistry of the National Research Council and a member of the Advisory Committee on the Fluoridation of Water Supplies of the Massachusetts Department of Dental Health.

Among his professional affiliations were the American College of Dentists, the American Association for the Advancement of Science, the Fédération Dentaire Internationale and the International Association for Dental Research.

FREDERICK C. FRIESELL DIES, FORMER DEAN AT PITTSBURGH

Frederick C. Friesell, former acting dean of the School of Dentistry, University of Pittsburgh, died September 2 at the age of 88. Dr. Friesell was graduated in 1898 from the Pittsburgh Dental College, a forerunner of the University of Pittsburgh's College of Dentistry. From 1906 to 1947 he served on the College staff as professor of bacteriology and histology and as secretary of the Faculty of Dentistry. In 1946 he became acting dean. Dr. Friesell was a Fellow of the American College of Dentists and a member of the International Association for Dental Research.

SUBSCRIPTS • A testimonial dinner in honor of Raymond J. Nagle, dean of New York University College of Dentistry, will be held November 16 by the Dentists' Division (Manhattan and the Bronx) of the Federation of Jewish Philanthropies. Reservations may be made through Louis J. Weber, 130 E. 59 St.

National Defense

HAROLD W. OPPICE APPOINTED TO RUSK COMMITTEE

Harold W. Oppice of Chicago, a former president of the American Dental Association, has been appointed by President Eisenhower to serve as a member of the Health Resources Advisory (Rusk) Committee of the Office of Defense Mobilization, a committee which serves also as the National Advisory Committee to the Selective Service System on the dentist-physician draft law. Dr. Oppice succeeds Leo J. Schoeny of New Orleans who resigned recently.

In addition to serving as Association president in 1950-51, Dr. Oppice has served as Trustee of the Eighth (Illinois) District, as editor of the *Illinois Dental Journal* and has held numerous offices in the Chicago and Illinois Dental Societies. He is chairman of the Special Committee on Trustee Districts which will report at the 1955 annual session this month.

DEFENSE DEPARTMENT ASKS SPECIAL CALL FOR DENTISTS

The Department of Defense has asked the Health Resources Advisory Committee to approve a special call for 119 dentists for the month of December. In making the request, Frank Berry, M.D., assistant secretary of defense (health and medical), stated, "The Department of Defense has been forced to ask for this special call for dentists because an insufficient number of the young graduates have volunteered for active duty to meet our requirements." Dr. Berry said that of the 780 dental graduates allocated to the Army, only 460 applied for and accepted a commission.

It is expected that the call when issued will be restricted to Priority III dentists who are also liable under the basic Selective Service Act.

The 1100th Dental Clinic Squadron, Headquarters Command, USAF, Bolling Air Force Base, in Washington, D. C. gave a luncheon recently to honor Oren A. Oliver (standing). Dr. Oliver, a past president of the American Dental Association and immediate past president of the Fédération Dentaire Internationale, is consultant in orthodontics to the Squadron. Seated (l. to r.) are: Maj. Walter C. Dorn, Col. Hal D. Oakley, Brig. Gen. Marvin Kennebeck, Kermit Knutson, Col. John Sitzman and Maj. Alexander L. Martone.

Brig. Gen. James P. Hollers (second from left), Air Force Reserve, discusses professional aspects of the Air Force dental service with (from left) Lt. Col. Russell Armstrong, Col. Sydney G. Gordon, Col. George T. Caen, and Col. Henry J. Tvrdy at the USAF hospital in Nagoya, Japan.

DENTAL PROGRAM PLANNED FOR ARMED FORCES SYMPOSIUM

The Dental Division of the Armed Forces will take part in the Sixth Annual Military-Medico-Dental Symposium October 17-21 at the U. S. Naval Hospital in Philadelphia. Two special sessions have been assigned to dentistry; they will take place October 18 and October 19. One retirement point credit will be given for each day of attendance. Army, Air Force and Navy Reserve officers not on the Inactive Status List may earn credit.

Chairman of the dental program is Col. Thomas P. Fox, (DC) USAR. Essayists include Capt. Clay A. Boland, (DC) USNR; Maj. Henry I. Copeland, (DC) USAF; Gerald M. McDonnel, (MC) USA; Herbert J. Towle (DC) USN; Claude Spencer LaDow, University of Pennsylvania; Lt. Col. Pierre O. Evans (D.C.) USA, and Robert B. Welden, (DC) USN.

CIVIL DEFENSE COURSE MAY BE OVERSUBSCRIBED

Dentists have been urged to apply at once for the civil defense course to be conducted by the Federal Civil Defense Administration in Battle Creek, Mich., November 16-18. In a letter to the American Dental Association, Russell W. Bunting, F.C.D.A. dental consultant, warned that the course may be oversubscribed and urged those planning on attending to send applications immediately to the F.C.D.A. in Battle Creek.

Public Health

HEROLD HUNT NAMED H.E.W. UNDERSECRETARY

Herold C. Hunt, a former consultant to the Council on Dental Health of the American Dental Association, was appointed undersecretary of Health, Education and Welfare September 2. Mr. Hunt has held administrative positions in public schools for over 25 years. He is a former superintendent of public schools in Kansas City, Mo., and Chicago. Since 1953 he has been Charles William Eliot professor of education in the graduate school of education at Harvard University.

DIVISION STATUS ACCORDED DENTISTRY IN IDAHO

Improved status for public health dentistry in Idaho was achieved in mid-August when the dental health section of the Idaho Department of Public Health was accorded division status. Previously, dental health activities were administered under the division of maternal and child health. In the reorganization of the health department, the name of the department was changed also. The department is now known as the Idaho State Board of Health. Wesley O. Young of Boise is director of the dental health division.

NEW POSTS FOR DENTISTS IN GEORGIA HEALTH DEPARTMENT

The Georgia Department of Public Health is seeking dentists to fill newly created district and regional posts. The Department is helping counties in the State to combine their facilities into district health departments. Public health dentists are to be employed for the dis-

tricts. In addition, dental consultants are needed to aid the new districts in developing their programs.

Starting salaries are as follows: $6,060 a year for recent dental graduates with no experience; $7,200 for those with a Master's degree in public health; $7,524 for those with administrative experience. Further information may be obtained from John E. Chrietzberg, director, dental public health services, State of Georgia Department of Public Health, Atlanta.

DENTISTRY FEATURED IN CITY PUBLICATION

The most recent issue of *Public Health Views,* a quarterly publication of the Philadelphia Department of Public Health, is devoted entirely to discussions of Philadelphia's public health dental problems and programs. The attractive lavender, black and white booklet contains articles by James P. Dixon, M.D., commissioner of health; J. M. Wisan, chief of the health department's section of dental health; Frank E. Law, dental consultant for the U.S. Public Health Service, Albert L. Borish, of the Philadelphia County Dental Society, and Grace D. Lofthouse, R.N., coordinating nurse of District 5, School District of Philadelphia.

SUBSCRIPTS • Edward V. Zegarelli, associate professor at the School of Dental and Oral Surgery, Columbia University, has been appointed to the 1956 National Health Forum Committee. The 1956 Forum will deal with the problem of long-term illness.

International

AMERICANS ON PROGRAM OF F.D.I. ROME CONGRESS

A number of prominent American dentists are on the scientific program of the Twelfth International Dental Congress scheduled for Rome, Italy, September 7-14, 1957. The Congress is sponsored by the Fédération Dentaire Internationale. Among American dentists on the program are George C. Paffenbarger, of Washington, D. C., American Dental Association Senior Research Associate at the National Bureau of Standards; LeRoy Ennis, of Philadelphia, presently dental consultant to the government of Egypt; George W. Teuscher, dean of Northwestern University Dental School in Chicago; J. A. Salzmann, editor of the *New York Journal of Dentistry,* and F. A. Arnold, Jr., director of the National Institute of Dental Research, U. S. Public Health Service, Bethesda, Md.

ALBERT JOACHIM OF BRUSSELS ELECTED F.D.I. PRESIDENT

Albert Joachim of Brussels, Belgium, was elected president of the Fédération Dentaire Internationale at its 43rd meeting held in mid-August in Copenhagen. Dr. Joachim succeeds Oren A. Oliver of Nashville, Tenn., who had served three terms. Obed H. Moen of Watertown, Wis., was named a vice-president, W. Riis Klausen of Copenhagen was chosen assistant secretary.

Re-elected were C. F. L. Nord of Amsterdam, honorary president; Harold Hillenbrand, American Dental Association secretary and chief of the U.S. delegation, one of the six honorary vice-presidents; LeRoy M. Ennis of Philadelphia, vice-president; G. H. Leatherman of London, general secretary; W. Stewart Ross of London, Council chairman; H. H. Stones of Liverpool, editor-in-chief; J. Stork, of

A donation of $2,500 was made to the Philippine Dental Association recently by Gervasio Eraña, "dean of the Filipino Dentists." The money, which was presented to the Board of Trustees, was to initiate the establishment of a trust fund for the erection of a permanent headquarters, dental library and museum. American dentists are invited to make contributions to the fund.

Aerdenhout, Holland, honorary treasurer, and Miss Dorothy E. Parrott of London, assistant treasurer.

The invitation of the American Dental Association to the F.D.I. to hold its 1959 meeting in New York in conjunction with the American organization's centennial celebration was accepted unanimously by the F.D.I.'s General Assembly.

Eleven U.S. dentists participated in the F.D.I.'s scientific program. Three films produced at the National Bureau of Standards were shown. Some 148 Americans attended the meeting.

JAPAN'S DENTISTS HOST TO ASIAN DENTAL CONGRESS

The Japanese Dental Association will play host to the First Asian Dental Congress October 14-16. In addition to the dentists of Japan, about 150 dentists from Formosa, the Philippines, Hong Kong and Indonesia will attend the meeting. Yoshio Ogura is president of the Japanese society.

NAME F.D.I. REPRESENTATIVES TO ANNUAL SESSION

Among distinguished guests at the American Dental Association's annual session in San Francisco October 17-20 will be two official representatives of the Fédération Dentaire Internationale. They are Knut Gard of Oslo, Norway, and Helge Berggren of Stockholm, Sweden. Dr. Gard is secretary of the Norwegian Dental Association. Dr. Berggren is director of the Eastman Institute of Stockholm and president of the Swedish Scientific Dental Society.

Also among the guests will be H. Parker Buchanan, secretary of the British Dental Association.

ALFRED GYSI CELEBRATES NINETIETH BIRTHDAY

Prof. Alfred Gysi of Zurich, Switzerland, internationally known prosthodontist, celebrated his 90th birthday August 31. Dr. Gysi is known for his basic studies in articulation and for the introduction of

an anatomical articulator which he called the "adaptable" articulator. Dr. Gysi is considered to be one of the men who has contributed the most to the study of the movements of the mandible for prosthetics. His articulator is among the few on which it is possible to represent the many movements of the mandible which must be considered for prosthetics.

VINCENZO GUERINI, DENTAL HISTORIAN, DIES

Vincenzo Guerini, author of *A History of Dentistry,* died in Naples, Italy, May 19. He was nearly 96 years old. Dr. Guerini's book, published in 1909 under the sponsorship of the American Dental Association, is generally regarded even today as the standard history of dentistry to 1800. Recent works use Dr. Guerini's *History* for source material. The 1909 volume was translated into English from the original Italian and was published by Lea and Febiger, New York.

General

NATIONAL APPLE WEEK POSTER HAS DENTAL HEALTH THEME

A poster stressing dental health will be widely distributed to schools and dental offices by the International Apple Association during National Apple Week October 20-29. The 9 x 20 inch poster shows a little boy eating an apple and carries the message: "Enjoy apples, an aid to dental health." The apple association distributed more than 100,000 copies of another dental health poster during the 1955 observance of National Children's Dental Health Week. Copies of the current poster may be obtained without cost from Mr. Norbert W. Eschmeyer, International Apple Association, 1302 18th St., N.W., Washington 6, D. C.

SCHEDULE CONNECTICUT LICENSURE EXAMINATION

The Connecticut Dental Commission has announced that the examination for dental licensure and the examination for dental hygiene licensure will be held November 13-19. The dental examination is scheduled for Columbia University School of Dental and Oral Surgery in New York City and that for the hygienists at the Fones School of Dental Hygiene, University of Bridgeport, Bridgeport, Conn. Applications should be in the hands of the recorder at least ten days before the examination. Further information may be obtained from Clarence G. Brooks, recorder of the Commission, New London, Conn.

Also • The Sigma Epsilon Delta fraternity has scheduled two meetings, the first in San Francisco, during the American Dental Association's annual session October 17-20; the second, December 7 in New York City in conjunction with the Greater New York Dental Meeting. . . . Also scheduled for San Francisco is the Northwestern University Dental School Alumni Luncheon. The date is October 19; place, St. Francis Hotel. . . . Thomas J. Glennon, D.M.D., of Woburn, Mass., and Arno M. Bommer, D.M.D., of Revere, have been named secretary and chairman respectively of the Massachusetts Board of Dental Examiners. . . . Nearly 250 million dollars were spent for oral hygiene products in 1954 according to the August 8 issue of *Drug Topics,* a trade publication.

The Reader Comments

THE JOURNAL *devotes this section to comment by readers on topics of current interest to dentistry. The editor reserves the right to edit all communications to fit available space and requires that all letters be signed. At the request of the author, signatures will be deleted before publication. Printed communications do not necessarily reflect the opinion or official policy of the Association. Your participation in this section is invited.*

The Editor

CHANGES MIND ON O.A.S.I. AFTER RECEIVING MORE INFORMATION

There have been a lot of pros and cons lately in the various journals regarding O.A.S.I. for the dentist, and it did seem that until recently the articles favoring this program were more numerous. I have since come to believe that this flood of letters is one of the main reasons that these so-called polls have shown a swing from the negative to the affirmative. I was one of those who voted yes some months ago on an unofficial postcard ballot because I had been influenced so much by these articles, which I see now were only giving half-truths. I would like to thank you for giving space in your recent issues to show the disadvantages of O.A.S.I., and I believe that any thinking person can readily see its shortcomings.

We have seen O.A.S.I. compared to a simple savings program, and some publicity was given to the advantages of the Reed-Keogh bill, but I have never seen a more enlightening article than the Chernoff report, which has been published in a number of state dental journals. Members of the House of Delegates should read this report. In spite of the fact that they may have been instructed to vote in favor of O.A.S.I. at the San Francisco meeting, it might be possible to cause them to vote it down again if all dentists who are in agreement with Dr. Chernoff and are opposed to inclusion would take the time to send a telegram to the Delegates during their meeting.

Dr. Chernoff has given us an analysis devoid of philosophy and other debatable considerations. The facts he gives us cannot be argued. I personally feel that any dentist after reading this report who would vote in favor of O.A.S.I. is motivated by reason of personal gain and not by what is best for the majority.

I am sure we will find most of the yes votes in the older age brackets where they stand to receive much more than they contribute—at the expense of their younger colleagues, who will be paying on this thing for 40 years more or less. We cannot fail to consider the generations of aspiring dentists-to-be. If their vote could be included in these surveys it would be a completely different picture. There is always the possibility of our wishes coming true, but if we must have our birthright exchanged for a mess of pottage, I hope we will be able to say it was not of our doing.

James E. Lofstrand, Missoula, Mont.

O.A.S.I. A PUBLIC DEBT

In answer to Dr. Thompson's letter in the August JOURNAL, I want to point out that the alleged social security assets, we'll say somewhere between 11 and 22 billions of dollars, are gone, spent, and are a part of the public debt. Interest thereon is a further liability to us taxpayers, not a "profit" to carry the cost of social security benefit payments as Dr. Thompson thinks. That interest is interest we must pay, not receive. The public debt is a mortgage on our property and on our incomes, not one we hold on some other person's property.

Dr. Thompson mentions the large number of people who are covered under Social Security. It was not a matter of their choice, and they don't necessarily like what they are stuck with. Extending Social Security to us would not make it any more right. Here is a quotation from a letter I received from L. M. Anderson, Sr., of the Dental Supply Co.

"Three cheers!!! Your article in the Florida journal speaks my thoughts exactly. Particularly so since I am under the Social Security through compulsion. In fact, I can almost get rabid on the subject, so don't get me started. My only hope is that the rest of the profession will take the same stand as you do."

Dr. Thompson quotes some of the government propaganda about the wondrous possible big returns to participants under Social Security. I could tell you about the possible returns from horse betting and roulette too. In the next paragraph, Dr. Thompson tells about the high cost of insurance with private free enterprise insurance companies. Their costs are based on quite precise mathematical tables and statistics. When their claim experience is more favorable than expected, and they show a profit from good investment, they return it to you in the form of dividends which reduce your insurance costs or add to the value of your investment as you elect. That is sound business, and they enter into a firm contract with you and your beneficiaries. Note that under Social Security those over 18 are no longer considered dependents. In my family and in some other families, 18 is the age at which the youngster completes high school or enters college. Do you see any youngsters getting college educations from Social Security benefits?

The costs of getting into Social Security are very real and bigger than you think, and you cannot get any contract to assure you or your heirs a worthwhile return.

We have the means at hand to achieve a satisfactory degree of financial independence with diligent attention to duty and good management; especially if we work, and fight, if necessary, to maintain our free enterprise system, including the right to buy or not to buy private enterprise insurance. I despise compulsion regarding conduct of my personal affairs.

It is true that we cannot do anything about those already under Social Security. I am talking only about leaving out our profession. I believe it is a privilege to stay out, and we can do so. To go along, uninformed, with the trend just because it is a trend or to accept a notion just because it is popular is far beneath the intelligence level of our profession.

It is a point of considerable gratification to me to note that most of our Society and Association officials from District societies on up and including our national president, who lives in Washington, D.C., and knows something about politics there, are opposed to our coverage under Social Security. I credit them with more thought and study on the matter than the general membership.

A few days after I wrote my previous article, one in the May *Confidential* magazine entitled "Social Security—The I.O.U. That May Never Be Paid!" came to my attention. If you really want information, read it. I will quote a few parts. "Here, outstanding experts reveal some frightening facts about the hard-earned dollars taken out of your pay every week for your security. (Q) Does Social Security provide old age insurance? (A) Absolutely not! says Dean Manion of Notre Dame Law school. (Q) Does the Government guarantee that you will get back what you pay in? (A) No! chances are only 3 out of 5 for a return on your money. (Q) Where will the Government get the money to pay old age benefits? (A) By *doubling* the Social Security bite on your paycheck!"

In the same article, Senator Walter F. George, speaking against the general Social Security bill, says: "Like most tyrants in the history of mankind, we are crucifying people for their own good . . . that is why I cannot support this bill . . ."

Carl F. Damerow, Vero Beach, Fla.

DENTIST CAN EARN MORE THAN $1,200 YEARLY UNDER O.A.S.I.

The article on Social Security which appears in the June issue of THE JOURNAL beginning on page 686 is in error. You, as an editor, owe it to the profession to acknowledge same.

Your article states, "During the time he is in receipt of such benefits before he attains age 72, he may not earn more than $1,200 per year. For each $80 he earns over that amount, one month's benefit is deducted."

This is dead wrong. I quote Mr. Christgau, national director of Social Security. "Regardless of the amount of the annual earnings of a beneficiary, benefits may be payable for any month in which he neither earns over $80 nor renders substantial services in self-employment."

So you see, the truth is that a dentist could earn any given amount (even $25,000) during the months he chose to work and then close his office (not render substantial services) the remaining months of the year, and he would receive his full benefit for each month he didn't work.

Do you stand for the truth or not? If so, don't you agree it is your duty to correct this.

John C. Foulk, Flint, Mich.

Editor's Note • Under the 1954 amendments to O.A.S.I., it is possible, as Dr. Foulk points out, to earn much more than $1,200 a year and collect substantial monthly retirement benefits. A fully insured person over the age of 65 might, for example, earn $5,000 or any other sum during one or more months of a given year. If he earns nothing during any of the remaining months, he could collect his monthly retirement benefits for each of those

months. It is apparent, however, that only under exceptional circumstances could an individual profit substantially from the 1954 alteration of the retirement test.

O.A.S.I. ACTUARIALLY UNSOUND

THE JOURNAL has given some excellent figures on the errors in calculation that the pro-O.A.S.I. group uses to influence the uninformed. By plain arithmetic it is obvious that for the great majority of dentists O.A.S.I. is no bargain. The polls seem to indicate that most of the support comes from older members who might be eligible for benefits after relatively few payments at the lower tax rates.

But the most important reasons for opposing O.A.S.I. are not simply the present figures of the law. In 1935 when O.A.S.I. was signed into law the nation was suffering the effects of the great depression, and there was need for financial aid to those who were unable to arrange a proper retirement program and protection for dependents in case of death. Self-employed persons were not included, probably because it wasn't considered necessary.

Tax rates were set on an approved actuarial basis with the rate increasing at intervals to furnish a reserve fund which would assure adequate funds to pay estimated benefits as they became due.

However, in 1940 the effects of the depression were still being felt, and Congress declined to follow the safe and approved actuarial principle set up originally. Perhaps for political reasons the tax was held at the original point of 1 per cent on the base wage for both employee and employer. By so doing, the reserve fund accumulation was decreased below safe limits. We have today an inadequate reserve fund.

This history illustrates the fact that the figures of the present O.A.S.I. law cannot be depended upon as a basis for an estimate of costs and benefits for any future time. Politicians may add and subtract at will, and those covered have no choice but to accept. As this is being written, new benefits have been voted in a Congressional committee which would add 1 per cent to the costs as presently outlined. Other increases will surely follow.

Life expectancy, increasing as it has in the past 50 years, suggests that in the foreseeable future the number of covered beneficiaries under O.A.S.I. will build to the point that tax rates will increase still further.

O.A.S.I. takes tax contributions from the worker. Although these are credited to his account and form part of the basis for possible benefits later, there is no cash balance he can call on in case of need. The costs of operating the system are, of course, charged against the taxes collected. For each one dollar paid in taxes, there is only 97 cents or 98 cents, after costs, available for benefits. To date, the tax contributions have been enough to set aside several billion dollars in the reserve fund, which is only a fraction of what it should be to meet actuarial standards. At present the reserve fund is "invested" in government bonds. These bonds pay 3 per cent interest. This may seem to be a profitable investment, but who pays the interest on government bonds? The same worker who pays O.A.S.I. taxes. And where would the money come from if a call was made on the bonds in the reserve fund? From taxes. O.A.S.I. taxes created the reserve fund which is now converted to bonds which can be reconverted to cash only by taking new tax money from the treasury. It is of no importance whether there are, or are not, government bonds in the reserve fund.

How, then, can anyone expect to receive in benefits more than about 98 per cent of what he has paid in taxes? Each one must believe that he, or his beneficiaries, will collect money that others have contributed and will never receive back in benefits. And dentists, with a life expectancy of less than 67 years, may well be one group most likely to contribute those sums necessary to pay benefits to some one else.

Wendell H. Taylor, Santa Monica, Calif.

Book Reviews

SURGERY OF THE FACE, MOUTH, AND JAWS

By Frank McDowell, M.D.; James Barrett Brown, M.D., and Minot P. Fryer, M.D. 213 pages with 168 illustrations. Index. $6.50. St. Louis, The C. V. Mosby Co., 1954.

This book is a compact, clinical treatise on surgery for lesions of the face, mouth and jaws. The monograph discusses examination of the mouth and jaws, technical points in surgery, inflammatory processes in the jaws and adjacent soft tissues, traumatic injuries, congenital anomalies, benign and malignant tumors and neck dissection for malignant carcinoma.

The various conditions and their treatment are outlined simply and lucidly. The authors present their ideas with the conviction characteristic of those possessing a wealth of knowledge and experience in the management of the specific problems. The section on cleft lips and palates and the accompanying illustrations and legends deserve special mention. The section on tumors also is handled admirably. The description of neck dissection is noteworthy, but it is unfortunate that indistinct labeling of the otherwise fine drawings renders them illegible.

This impressive monograph is designed primarily for oral and maxillofacial surgeons. However, it will be of value also to dentists and dental students, for it provides an excellent background for the diagnosis of the different surgical conditions occurring within the oral cavity, especially with reference to malignancy of the orofacial regions.

James Springer

TUMORS OF THE MAJOR SALIVARY GLANDS

By Frank W. Foote, Jr., M.D., and Edger L. Frazell, M.D. 149 pages with 184 illustrations and 2 color plates. $1.50. Washington, D.C., Armed Forces Institute of Pathology, 1954.

TUMORS OF THE STOMACH

By Arthur Purdy Stout, M.D. 104 pages with 66 illustrations and 6 color plates. $1.75. Washington, D.C., Armed Forces Institute of Pathology, 1953.

TUMORS OF THE SOFT TISSUES

By Arthur Purdy Stout, M.D. 138 pages with 78 illustrations and 6 color plates. $2. Washington, D.C., Armed Forces Institute of Pathology, 1953.

TUMORS OF THE RETROPERITONEUM MESENTERY AND PERITONEUM

By Lauren V. Ackerman, M.D. 136 pages with 105 illustrations and 4 color plates. Price $1.50. Washington, D.C., Armed Forces Institute of Pathology, 1954.

These monographs are, in reality, not separate books but four parts of an inclusive atlas of tumor pathology sponsored by the American Cancer Society, the Anna Fuller Fund, the Armed Forces Institute of Pathology, the Jane Coffin Childs Memorial Fund for Medical Research, the National Cancer Institute, the U. S. Public Health Service and the Veterans Administration. Each portion is bound in paper and stapled together with perforations for temporary binding in convenient groupings for use before the completion of the project.

Although there are no indexes, each folio has an adequate table of contents; there are generous references to the literature. The illustrations are superb for the most part and reproduced on heavy, glossy paper. The text in each volume has been prepared by tumor experts specializing in the field covered by that particular part of the atlas, which gives it an authority and significance otherwise impossible.

The placing of each part in production as soon as it has been completed serves two useful purposes; early availability is achieved and the opportunity exists for buyers to limit their purchase to the area of their special interest. The dentist, oral surgeon and oral pathologist are likely to be interested chiefly in the monograph on salivary gland tumors rather than in the other three monographs included in this review. They will be impressed also with the fact that in a 20 year period at the New York Memorial Cancer Center only about 900 patients with salivary gland tumors have come to this clinic. Most of the tumors reported were of the parotid gland; tumors of the sublingual gland are extremely rare. There is a great need for additional well documented individual reports in this area.

Edward H. Hatton

BASIC ANATOMY

By G. A. G. Mitchell, O.B.E., and E. L. Patterson, M.D., 438 pages with 286 illustrations. Index. $10. Baltimore, Williams & Wilkins Co., 1954.

The authors have written this condensed text as an elementary, introductory course in basic anatomy for dental and medical students. The information presented stresses that a general knowledge of the entire organism is required for the first term in human anatomy.

Although this text is entitled *Basic Anatomy*, it is essentially a histological text presented academically, with exceedingly few pragmatic or functional applications. In our American academic curriculum, the text could be used in the colleges and universities for courses in general biology, general zoology or elementary histology.

The chapters on the histology of the various systems (which comprise the majority of this book) are excellent. However, for a basic text of this category, the histology of the nervous system and vascular system is exceedingly long in contrast, for example, to the last chapter on the endocrine system. The illustrations are excellent, but there is a tendency to insert too many labels and to show anatomic structures which may be confusing to the reader.

In a condensed text of this type the authors (from an academic standpoint) have presented their subject satisfactorily. It is recommended as an elementary or reference text to the dental and medical students and general practitioners.

George M. Matsumoto

G. V. BLACK'S OPERATIVE DENTISTRY

By Robert E. Blackwell, D.D.S. Ninth edition. Volume I—355 pages with 263 illustrations. Volume II—458 pages with 574 illustrations. Index. $22.50. South Milwaukee, Wis., Medico-Dental Publishing Co., 1955.

These volumes are designed as textbooks and as reference books. If the practicing dentist has not obtained a copy of the previous editions, this one would serve well as a library foundation. The two volumes are clearly printed on good stock and are suitably illustrated.

The basic idea expressed in Volume I, and continued in Volume II, is that the natural dentition of nearly everyone can be conserved throughout the childhood period and well into adult life until those degenerative processes set in over which we have little or no control.

The present work is devoted primarily to (1) the etiology and pathology of caries, hypoplasia, enamel fluorosis, erosion and abrasion; and (2) a program for the management of patients which provides for the prevention or early discovery of lesions of the teeth and their supporting structures and for the conservation of the pulp.

The chapter on principles of cavity preparation is especially well done, and periodic reading by all would prove most beneficial.

Robert B. Oppice

DIE ZAHN-, MUND- UND KIEFER-HEILKUNDE: EIN HANDBUCH FÜR DIE ZAHNÄRZTLICHE PRAXIS (THERAPY OF THE TEETH, MOUTH AND JAWS: A MANUAL FOR THE DENTAL PRACTICE)

Edited by Prof. Karl Häupl, Prof. Wilhelm Meyer and Prof. Karl Schuchardt. For sale in complete set only. 650 DM. München-Berlin, Urban & Schwarzenberg, 1954-1955.

Issue 9 contains parts of volume I (Anatomy, Physiology and Pathology) as follows:

SENSORY PERCEPTION IN THE ORAL CAVITY • By Dozent Herbert Hensel, Heidelberg. 19 pages with 8 illustrations.

The author discusses taste, pressure, temperature and pain. Many of his deductions are based on his own interpretation. Most of these deductions have a factual basis. The author gives a somewhat different concept of the sensory perception in the oral cavity than that which is generally held.

PATHOLOGY OF THE TEETH AND DENTITION • By Prof. Wilhelm Meyer, Göttingen. 135 pages with 222 illustrations (some colored).

The author describes the pathology of teeth and dentition. His contributions embrace many tests and methods. An adequate bibliography is missing, however.

Issues 10 and 11 contain parts of volume V (Orthodontics) as follows:

CEPHALOMETRIC EXAMINATIONS OF MALOCCLUSIONS • By W. Grossmann, London. 21 pages with 21 illustrations.

The author discusses cephalometric roentgenography and teleroentgenography. He urges the use of both methods in diagnostic and prognostic analysis. Grossmann's contribution, especially his excellent description of the cephalometer and cephalostat, will be of interest to all orthodontists.

THE ORTHODONTIC DIAGNOSIS • By Hans Wunderer, Düsseldorf. 9 pages.

The author pleads for a new systematic division of phenomena in orthodontic diagnosis which would consider morphological and etiological circumstances. He suggests the use of accurate impressions and pictures, for "words often are unable to convey what eyes easily comprehend."

PRINCIPLES OF ORTHODONTIC THERAPY • By Prof. Karl Häupl, Düsseldorf. 12 pages.

The author criticizes the present state of orthodontic diagnosis. In his summary he presents a proposed reform in therapeutic methods and suggests the use of more "active" than "passive" equipment.

FUNCTIONAL THERAPY: GENERAL PRINCIPLES • By Prof. Karl Häupl, Düsseldorf. 48 pages with 66 illustrations.

The objective of this article is to provide evidence for the use of the activator in treatment of malocclusions characterized by a narrow, pointed arch with deep and overbite. The author underlines the usefulness of Eschler's labial wires in vestibular-oral movements. A detailed analysis of controversial points is omitted.

FUNCTIONAL THERAPY: PARTICULARS • By Dozent Ludwig Petrik, Vienna. 137 pages with 619 illustrations.

This article also is on the subject of the activator, its characteristics, development and application, its construction, completion and transfer. The author gives sound instructions to parents and children in regard to the use of this instrument and describes many instances where an activator should not be applied. The final chapter deals with the correct beginning and termination of orthodontic therapy and reports on successful treatments. Excellent photographs accompany the explanation of Angle's classification of malocclusions, the construction and application of bite-correcting bars, and the posttreatment of the temporomandibular joint.

MUSCULAR FUNCTION AND ORTHODONTIC THERAPY • By Prof. J. Eschler, Freiburg/Br. 24 pages with 27 illustrations.

The author describes the physiology of the muscles, muscular activity, dental strain and methods of orthodontic treatment. He believes that making the muscular activity a basis of therapy by the use of gymnastic methods (Andresen-Haüpl's system of muscular reflexes) is superior to the method generally used.

INSTRUMENTS, DEVELOPED FOR FUNCTIONAL ORTHODONTICS • By Prof. A. Martin Schwarz, Vienna. 21 pages with 11 illustrations.

This paper contains material not always available in American textbooks, for instance the description of Binder's elastic formulator, Mühlmann's propulsor and Tegtmeier's impulsator. It cites many references including recent international research material.

THE SELF-ACTIVATING ORTHODONTIC PLATE • By Prof. A. Martin Schwarz, Vienna. 45 pages with 52 illustrations.

The author investigates the advantages of removable over fixed orthodontic appliances. He describes the innovation of essential parts, recent methods of construction and the applications of the self-activating orthodontic plate. He closes with an extensive bibliography of more than 100 references.

Issues 12, 13 and 14 contain parts of volume II (Pharmacology, Roentgenology, Microbiology and Conservative Therapy) as follows:

MICROBIOLOGY OF THE ORAL CAVITY • By Prof. Franz Schütz and Dr. Jörg Jensen, Bielefeld. 85 pages with 188 illustrations. (Partially reviewed in J.A.D.A., December 1954.)

The authors have written an article on the microbiology of the oral cavity and give considerable information regarding methods of disinfection and sterilization; bacteria, rickettsia and viruses, as well as an almost complete description of the bacteriology of caries and periodontitis and the microbiology of focal infections.

CARIES: CLINICAL DIAGNOSIS AND THERAPY • By Prof. Ewald Harndt, Berlin. 147 pages with 371 illustrations.

This article is a valuable and timely addition to the literature on caries. The subjects discussed are: topography and clinical course, diagnosis, prophylaxis, therapeutic methods for treating carious defects, preparation of cavities, prevention of pain during these preparations, plastic and other fillings. The author urges individualized treatment by careful examination, diagnosis and therapy. The writing is difficult to understand as the author uses the academic scientific German language. The bibliography, covering four pages, is complete.

DISEASES OF THE PERIODONTIUM ABOUT THE APEX • By Prof. W. Hess, Zürich. 43 pages with 27 illustrations.

The author writes an interesting article in simple language, easy to understand by all who can read German. The chapters on

diagnosis and treatment of uncomplicated gangrene, anatomy of root canals, electrosterilization and iontophoresis, antibiotics, diseases of periapical tissues, acute and chronic apical periodontitis and focal infections are almost complete and include recent research material.

DISEASES OF THE MARGINAL PERIODONTIUM • By Prof. C. H. Fischer, Göttingen. 41 pages with 18 illustrations.

Although some procedures presented have been replaced recently by other methods, this article covers many technics applicable to the removal and extirpation of diseased pulp, mechanical-chemical dilatation of root canals and disinfection and sterilization. He discusses filling of root canals with chlor-phenol-camphor-menthol, paraformaldehyde and calcareous pastes. Excellent drawings and illustrations are included.

PUBLIC HEALTH DENTISTRY FOR YOUNG PEOPLE • By Prof. Rudolf Müller, Münster. 21 pages.

In discussing German public health dentistry as practiced in the schools, Professor Müller emphasizes the different results achieved by application of the "Bonn," "Frankfurt" and "Mannheim" systems; he does not explain, however, the reasons for these variations. In Western as well as in Eastern Germany, this public health service is on a compulsory basis. The concluding paragraphs deal with statistical material on caries of deciduous teeth of the first graders and on gingivitis during puberty, before and after examination and treatment. This article presents no particularly new or startling concept, and neither the text nor the statistical material is impressive.

DISEASES OF THE ORAL MUCOSA AND THE LIPS • By Prof. Hans Schürmann, Würzburg. 140 pages with 90 illustrations.

In this article the author shows not only inclusive knowledge of the recent literature on biology and microbiology, but, what seems more important, an extensive and varied clinical experience. In a concise, simple and clear exposition, he enumerates the diseases of the oral mucosa and lips and the causes of disease, such as bacilli, bacteria, fungi and viruses. Laboratory tests and diagnostic methods are given in detail, and their limitations are pointed out. The references at the end of each chapter include the most recent European and American literature. This article is written in a style easy to read; the illustrations are abundant and highly instructive. A vast amount of theoretical and practical material is included which will appeal to the general practitioner and the specialist alike.

Issues 14 (continued), 15 and 16 contain parts of volume II (Pharmacology, Roentgenology, Microbiology and Conservative Therapy) as follows:

INTERNAL MEDICINE • By Prof. H. J. Wolf, Bielefeld, 255 pages with 2 black and 16 colored illustrations.

This excellent and voluminous article gives extensive basic information on the present state of internal medicine. It will be of interest to dentists who almost daily observe various symptoms in the oral cavity, on the face or neck that are caused by diseases or disturbances of internal organs. This text contains a full description of inflammations of different origins, disturbances of circulation or metabolism, swelling of glands, deficient blood supply, anemia and vascular spasm. It reviews also pathology and physiology as well as tested therapeutic methods. Only a few illustrations are included; an addition of microphotographic material as well as roentgenograms and diagrams would enrich this article. It is surprising, however, to find such a large quantity of well-chosen information, covering so wide a field, authoritatively presented by one author. The comprehensive bibliography refers to many international medical and dental sources.

NEUROLOGY • By Dr. F. W. Knoll, Santiago de Chile. 27 pages with 4 illustrations.

The dental profession should become more aware of medical research in the field of neurology. The author approaches his subject from the physician's viewpoint; however, he is able to make this article interesting to dentists. In the chapters covering the autonomic nervous system, diseases of cerebral and peripheral nerves, of spinal cord and the tongue the author presents a clear classification of cause, development, diagnosis and therapy. His article therefore contrasts favorably with many other recent works that are written without any regard for the pressure under which medical literature is read by busy dentists. An extensive bibliography adds to the text; however, a larger amount of illustrative material would be desirable.

The value of this monumental text is greatly enhanced by the profusion of excellent illustrations, drawings, diagrams, microphotographs and roentgenograms. This series makes a valuable addition to the orthodontic library.

Paul H. Glucksman

DENTISTRY AS PRACTISED 1800-1921

By J. Menzies Campbell. 11 pages. 35 cents. London, Benevolent Fund of the British Dental Association.

The three chapters in this informative pamphlet cover the periods 1800-1850, 1851-1878 and 1879-1921. The author's modest aim is "to present a 'bird's eye view' of the fight (of dentistry) for status and prestige from the British—more particularly the Scottish—standpoint." The text originally appeared as a series of articles in *The Glasgow Herald.* The author lists the major dates, personalities and achievements in the history of British dentistry. His amusing vignettes of the charlatans who practiced dentistry in the first half of the nineteenth century are noteworthy.

In 1856 the College of Dentists, with 150 members, and the Odontological Society of London, with 50 members, were founded. Both bodies founded training centers and published dental journals. The two merged in 1863 to become the Odontological Society of Great Britain.

Neither the Medical Act, 1858, nor the Dentists Act, 1878, succeeded in protecting the dental practitioners and the public. The British Dental Association was founded in 1880 to consolidate the profession and protect it and the public. Not until passage of the Dentists Act, 1921, did dentistry become a "closed profession."

Verdict: A bird's-eye view of the progress of British dentistry.

N. C. Hudson

THE COAGULATION OF BLOOD, METHODS OF STUDY

Edited by Leandro M. Tocantins, M.D., 240 pages with illustrations. Index. Appendix. $5.75. New York, Grune & Stratton, 1955.

Blood clotting has seemed in the past to be a simple phenomenon, one capable of being precisely characterized and quantitatively evaluated. Recent studies, however, have revealed the complexity of the process and destroyed the illusion of its simplicity. What appeared at first to be a straightforward enzymatic modification of a protein has emerged as a highly integrated system of interacting accelerators and inhibitors. With this growth in understanding of the complexity of the mechanism, there has inevitably developed a confusion of terms and of technics that has been the despair of professional men not working in the field. This book is an important step in the direction of elucidation of technical procedures indispensable to investigators of all aspects of blood clotting.

The process involves four main events: prothrombin gives rise to thrombin, if inhibitors do not prevent; this step is followed by the transformation of fibrinogen to fibrin and the subsequent neutralization of thrombin activity by antithrombin. Many substances are involved in the activation of prothrombin, and specific methods for quantitative detection are described in the book. The quantitative methods presented are the cornerstone of all concepts we consider reliable. The book includes also methods for the purification of certain substances concerned with the blood clotting mechanism. The author not only presents the methods but gives their underlying basis and limitations. Each of the methods is presented clearly and is followed by current references. The book is an invaluable contribution to all scientists interested in the clotting problem.

I. Newton Kugelmass

POMP AND PESTILENCE: INFECTIOUS DISEASE, ITS ORIGINS AND CONQUEST

By Ronald Hare, M.D. 224 pages. Index. $5.75. New York, The Philosophical Library, Inc., 1955.

This short volume on the influence of infectious disease on the history and development of civilization is written in a most readable manner and is well documented. Although the subject matter is broad in scope and has been presented in books for both the lay and scientific public, Professor Hare has succeeded in retelling this absorbing story with the addition of some little known references and information. The treatment of the subject matter is neither exhaustive in scope nor exhausting to the reader. One may open the book to any chapter or passage and begin reading with interest.

The author begins with a chapter on the nature of parasites and parasitism. He makes a distinction between contagious and infectious diseases as well as between symbiosis and parasitism. These states are correlated to the resistance and reactions of the host. The chapter on man and his parasites traces the spread of disease by man during his explorations and adventures.

This chapter and the following one on parasites and pestilence show the price that was paid by the adventuresome Europeans for their spirit of exploration, trade and colonial expansion. One cannot help but be impressed

by the devastation caused by newly imported diseases from the regions outside of Europe. The relentless attacks on the military by epidemics points out the great influence of microbes on human history.

The discussion of the nature of disease as propounded by Empedocles and Hippocrates is of special interest. The development of the germ theory of disease is presented, keeping the contributions of those that preceded Pasteur and Koch in a proper perspective. However, the contributions of Pasteur are handled in a lighter vein than this reviewer feels is justified.

The book closes with a chapter on parasites and their influence on populations today as exemplified by infant mortality rates. The increased survival of infants now raises a problem of swelling populations living on marginal lands and in congested regions where food and living space are at a premium. The book closes on this bleak prospect for the future, with little feeling that the ingenuity of man can cope with the issue as he has with the problems of the past.

Sol Haberman

CHRISTOPHER'S MINOR SURGERY

Edited by Alton Ochsner, M.D., and Michael E. DeBakey, M.D. Seventh edition. 547 pages with 251 illustrations. Index. Price $9. Philadelphia, W. B. Saunders Co., 1955.

This seventh edition of a well-established and highly popular medical book has been completely revised and rearranged. Many sections have been rewritten, old material has been discarded and considerable new material added. The book continues to be addressed principally to the young physician whose professional services include the treatment of less serious ailments and injuries. The new arrangement according to systems, with a subgrouping of the various disorders affecting each system, facilitates its usefulness as a guide and ready reference, a guide which major surgery texts do not provide.

Although the book was intended primarily for the medical profession, any branch of the healing arts dealing with care of the patient will find ample material within its covers to qualify its status as a bookshelf requisite. The intern and resident in the hospital, in both medicine and dentistry, will find that this book was particularly designed to meet his needs. A special chapter, "The Surgical Resident," should be required reading for the house staff of every hospital.

The subject material is excellently arranged and provides a high degree of readability. The illustrations are clear, but are of insufficient number to depict the subject material adequately. Less than half the illustrations found in previous editions are present in this volume. This reduction is in keeping with the reduction of contents of the entire book.

It would appear that in an attempt to be too inclusive, many major surgical problems are placed under the category of minor surgery. The chapter on tumors reviews several malignant neoplasms; the chapter on deformities and anomalies deals with major orthopedic problems, and the discussions of disorders of other systems include pathologic conditions that hardly can be classed as minor surgery. This apparent discrepancy, however, is readily understandable, considering that the practice of minor surgery requires a broad general knowledge of surgical diagnosis and the ability to differentiate the major surgical conditions from the minor ones.

The dentist will find 13 pages devoted to diseases of the mouth. This scanty discussion of several oral diseases in itself would not warrant the text's position in the dentist's library, but the brief discussion of the many conditions that may confront the dentist does justify ownership.

Herbert J. Bloom

A TEXTBOOK OF PHYSIOLOGY

Edited by John F. Fulton, M.D. Seventeenth edition. 1,275 pages with 600 illustrations. Index. Price $13.50. Philadelphia, W. B. Saunders Co., 1955.

This textbook is the result of collaboration of well-known physiologists. The subject matter is dealt with adequately with the exception of endocrinology. The chapters on nerve and muscle physiology are exceptional in their content.

It is hoped that in future editions the material will be better organized, particularly the sections on blood and circulation. There is some redundancy and overlapping in these sections, because a different author wrote each chapter. It is possible in these chapters to lose sight of the circulatory system as a unified functioning system made up of different components which act together to produce one result.

The style of writing of this book is conducive to readability. The type and format are good also. This book is especially useful to those who are interested in muscle and nerve physiology.

Robert C. Worley

ILLUSTRATED HANDBOOK OF CHILD CARE FROM BIRTH TO SIX YEARS

By Wava McCullough and Marcella Gawronski, R.N. First edition. 232 pages with illustrations. Index. Price not listed. New York, McGraw-Hill, 1954.

The authors of this volume have rendered a real service to the new mothers and practical nurses for whose instruction the book was designed. It is a concise, readable and essentially accurate synopsis of practical methods in the physical care of infants and young children, and its educational value is enormously increased by the profuse and clever illustrations of Miss McCullough.

The subject of child care is an ever-important one and one on which much good information is already available. The technics of feeding, bathing, clothing and formula preparation are discussed in a thorough but routine way. However, certain subjects are more fully and accurately treated in this volume than in most of the standard baby books. For example, a whole chapter is devoted to the important field of accident prevention and first aid. The illustrations here are effective to an amazing degree, and in combination with the clear and specific suggestions in the text, should create real interest in a positive program of accident prevention by the reader.

Also such matters as the selection of play materials at various ages, traveling with infants and young children, the requisites and training of baby sitters and the specific physical and mental needs of twins and their parents are covered more fully than is usual.

A few points in the text seem to be inconsistent with current pediatric opinion, or at least open to argument; for example the statements that: (1) the fontanels disappear around 18 months or two years; (2) shoes for the walking infant should be high enough to support the ankles; (3) appendicitis typically starts with pain followed by fever (with no mention of nausea, anorexia or vomiting). The omission of aspirin from the list of substances to be located safely out of reach of toddlers and children is also disturbing, since aspirin is not only one of the most frequent causes of fatal poisoning, but probably the one of which the layman-reader is least aware.

However, the good points of this handbook far outweigh these few criticisms, and it should be welcomed as a valuable addition to the literature on the subject of child care.

Mary Richards

SURGERY FOR DENTAL STUDENTS

By Michael F. A. Woodruff, M.D. 326 pages with 108 illustrations. Index. Price $6.50. Springfield, Ill., Charles C Thomas, 1954.

In writing a foreword for this book, S. H. Wass says, "Dental surgery is but a specialized branch of general surgery, and no specialist can practice his art unless he has had a thorough grounding in general surgical principles. . . . This is not a textbook of dental surgery. It is an account of the principles of general surgery illustrated wherever possible by applications of particular interest to the dental student." These statements seem to define the author's objectives. In this small book, the author proceeds to carry out his objectives in an orderly, precise and effective manner.

The hundreds of different operations which have been devised are classified by the author under one of the following headings: incision and drainage, creation or closure of a fistula, removal of diseased or abnormal structures, division or excision of normal structures, operations for the arrest of hemorrhage, reconstructive operations and operations to provide local rest to a diseased or injured part. After making this classification, the author proceeds to a brief discussion of each type of operation listed.

Chapter 3 deals with congenital disorders, and under this heading are included hemophilia, syphilis, cleft lip and cleft palate. Chapter 4 consists of a discussion of inflammation and repair, and chapters 5 and 6 describe bone and joint injuries and the methods of treatment. The etiology and treatment of hemorrhage and shock and of injuries due to thermal and chemical agents are described. Inflammation resulting from pyogenic bacteria and focal infection is discussed. Tumors, both malignant and benign, are included, and their treatment outlined.

Chapter 18, entitled "Diseases of the Lymphatic System with Special Reference to the Lymph Nodes of the Head and Neck," is particularly well written. There is an informative line drawing of the head and neck to illustrate the position of the various lymph nodes discussed in the text.

This book is well printed but rather poorly bound. It is a well-written book, designed to give the oral surgeon an understanding of the principles of general surgery on which his surgery should be based.

Warren R. Schram

Current Literature

THE EFFECTS OF PROTEIN DEPRIVATION UPON THE ORAL TISSUES OF THE RAT AND PARTICULARLY UPON PERIODONTAL STRUCTURES UNDER IRRITATION

S. Sigmund Stahl, D.D.S., Henry C. Sandler, D.M.D., and Lester Cahn, D.D.S. Oral Surg., Oral Med. & Oral Path. 8:760 July 1955.

This investigation was planned to study the effects of periodontal irritation on adult rats exposed to various degrees of protein deprivation. At various intervals during the experiment, an oral irritant was placed around the neck of the first molar on one side. All the rats on a protein-deficient diet lost weight continuously. At varying intervals the animals were sacrificed.

Protein-deprived animals showed a loss of hair luster, developed ulcerations of the skin, and a few developed partial paralysis of the posterior limbs. Oral changes associated with protein deprivation consisted of thinning of epithelium, with decrease of height of papillae of the tongue and atrophy of muscle bundles of the cheek and tongue; persistent osteoporosis of the alveolar bone; and considerable periapical destruction subsequent to pulpal exposure.

An irritant around the neck of the tooth in a protein-deprived animal caused flattening of the interdental papillae and degeneration of connective tissue fibers, considerable resorption of the alveolar crest and retardation of repair. The observations suggest that local irritants superimposed on protein-depleted tissues produce a greater degree of degeneration of periodontal tissues.

H. J. Bloom

ANOMALIES OF HUMAN DENTINE

Martin A. Rushton. Brit. D.J. 98:431 June 21, 1955.

Hereditary opalescent dentin or dentinogenesis imperfecta was first described in 1882. It is not known whether the two conditions are the same although they seem alike. There is no substantial evidence that the dental defects in osteogenesis imperfecta and opalescent dentin are due to the same gene. Opalescent dentin is seldom transmitted by a parent with teeth of normal appearance. One family is traced back to the eighteenth century.

As the teeth are so alike in these conditions, they are described together. Tooth size is normal to small with small predominating. Color varies, translucency is increased and after eruption, the color becomes brown with blue and pink lights. Normal color does not exclude the anomaly. Enamel fractures off easily, dentin wears with highly polished surfaces, and color goes from golden or amber to dark brown. The pulp cavity is gradually obliterated by formation of dentin with few tubules. Usually all teeth are affected. The principal defect is in the structure of the organic part of dentin. The teeth are soft and wear away quickly. Caries is considered uncommon and spreads laterally as there are few tubules to aid penetration pulpally.

"Shell teeth" exhibit a dentin variation in which there is little dentin formed, and the pulp cavities are enormous. Crowns are normal externally. A thin peripheral layer of tubular dentin and irregular calcified material is present. No odontoblasts are found. The teeth fail mechanically because they lack roots.

"Rootless teeth" have practically no roots, pulp cavities or apical foramens. The condition was thought to have occurred in the grandfather, mother and six children of a certain family. Crowns are normal; the dentin has an enormous number of spherical bodies embedded in it. The disorder stems from premature formation of collagenous matrix and lack of pulp cell proliferation. In one instance reported, the condition was associated with calcinosis universalis. Odontoblasts and tubules are present but disarranged by the collagen deposits. Cyst formation and apical infection occur, and the teeth are lost because of the short roots.

S. S. Arnim

JOURNAL OF DENTAL RESEARCH
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THE ELECTRON MICROSCOPY OF THE ENAMEL SURFACES OF TEETH UNDER VARIOUS ABNORMAL CONDITIONS

Shosaburo Takuma, p. 152.

In order to determine the border line between the normal and abnormal states of the outer surface of enamel which can be seen under an electron microscope, a comparative study was made of healthy teeth and various abnormal

teeth (mottled enamel, dilacerated tooth, unerupted tooth, tooth in dentigerous cyst, hard odontoma and carious enamel). The following observations were made.

An enamel surface of a healthy tooth consists uniformly of fine particles of 0.05 to 0.15 microns in diameter. An abnormal enamel surface, however, is composed of particles of different sizes which are generally larger than those of a normal enamel surface. The carious change in enamel is characterized by roughening of enamel substance and grain-like destruction. These changes occur in two ways: one begins at the rod ends, the other at the rod end and in the interrod region simultaneously. These changes were observable on the enamel surface on which artificial caries was induced.

STUDIES IN THE REATTACHMENT AND REGENERATION OF THE SUPPORTING STRUCTURES OF THE TEETH. III. REGENERATION IN EPITHELIZED POCKETS

W. J. Linghorne and D. C. O'Connell, p. 164.

Case reports which suggest that regeneration of supporting structure follows periodontal treatment appear periodically in the literature. In clinical studies this apparent regeneration has been observed occasionally after conservative periodontal treatment in which no attempt was made to remove the pocket epithelium.

In this study, 15 epithelized pockets, approximately 10 by 6 mm., were prepared by surgical means in dogs with healthy gingival tissue. Conservative periodontal treatment was performed, and the pockets were observed over a period of 18 months. Observations on the living animal, supported by histologic examination, indicated that a considerable amount of reattachment and regeneration of supporting structure occurred in the majority of cases. A hypothesis is advanced to explain how regeneration of the supporting structure may occur in the experimental animal after the production of epithelized pockets.

EVANSTON DENTAL CARIES STUDY. XII. A SURVEY OF LACTOBACILLUS COUNTS WITH REFERENCE TO UNTREATED CARIOUS SURFACES BEFORE AND AFTER EXPOSURE TO FLUORIDATED WATER

Iden N. Hill, p. 178.

It is the purpose of this report to attempt to draw some conclusions from the data gathered in the Evanston Dental Caries Study regarding the relation of lactobacillus counts to dental caries prevalence rates. The saliva samples were grouped according to lactobacillus count, the low division comprised counts ranging from 0 to 9,999, the moderate division those with counts of 10,000 to 49,999 and the high division those with counts of 50,000 and over.

Negative lactobacillus counts included in the low division were separated and tabulations made of them. From 1946 through 1953, 2,235 children were examined. The percentage of children in the low lactobacillus division with negative lactobacillus counts increased from 43.75 per cent for the 6 to 8 year old group in 1946 to 57.57 per cent in 1953. In the older age group, 12 to 14 year olds, the percentage in the low division with negative lactobacillus counts rose from 39.13 per cent in 1946 to 42.63 per cent in 1952.

Fluorine was added to the Evanston water supply in 1947. For the older age group the number of untreated carious surfaces found in the low lactobacillus count division was reduced 17.55 per cent from 1946 through 1952. In the moderate lactobacillus division the untreated carious surface rate was reduced 19.21 per cent, and in the high lactobacillus count division a reduction of 38.17 per cent was noted.

ANALYSIS AND INTERPRETATION OF DENTAL FIGURES FROM THE PENNSYLVANIA SCHOOL EXAMINATIONS, 1950-1951, 1951-1952

Benedict B. Kimmelman, p. 188.

Observations from dental examinations in 1950-51, and 1951-52 of 1,874,067 Pennsylvania school children, reported by Grace, are a reliable source of new data which have not been analysed heretofore. This paper presents an analysis of DMF totals and components in terms of averages at each age from 6 to 18.

The average DMF rises each year from 0.44 at age 6 to 12.0 at age 18. In terms of numbers of permanent teeth usually present, the DMF at age eight is over half the DMF at age 14. The number of carious teeth (D) rises from 0.36 at age 6, to 3.9 at age 18. Tooth mortality (M) rises each year from 0.01 at age 6 to 3 at age 18. The number of filled teeth, presently intact, (F) rises each year from 0.07 at age 6 to 6.7 at age 17, from one-sixth the requirement at age 6, to half the requirement at 17. Thus, at age 18, the average DMF or caries experience of the Pennsylvania school child is 12 teeth as fol-

lows: carious (D), 4; filled (F), 5; extracted or requiring extraction (M), 3.

THE DRYOPITHECUS PATTERN IN RECENT DANES AND DUTCHMEN

Knud Dreyer Jorgensen, p. 195.

In accordance with Gregory's original description, the Dryopithecus pattern of the lower molar teeth in simiids and hominids is a complex of morphological structures, whose evolutionary changes are little correlated phenotypically. Therefore, it is suggested that these teeth be described separately. This suggestion refers especially to the two structural "elements," the groove pattern and the cusp number. Further, it is suggested that the groove pattern be divided into three well-definable, successive stages, indicated by the signs "Y," "+" and "X."

Danish and Dutch lower molars were obtained from medieval burial places and from the tooth collection of modern Amsterdamers in the Anatomo-Embryological Institute in Amsterdam. The patterns of these molars are described. In the Dutch series, there is a significant difference with regard to the frequency of the Y pattern on the right and left first molars and a considerable difference with regard to the cusp number on the right and left third molars. Similar differences between the right and left molars could not be shown in the Danish series.

In discussing previous observations on the modification degree of the Dryopithecus pattern in the teeth of different ethnic groups, it is emphasized that a comparison on an exact statistical basis is rendered difficult by: (1) the absence of a precise definition of the concepts of groove pattern and cusp, (2) the different degree of wear in the specimens, and (3) the lack of a consistent distinction between right and left sides and between the teeth of males and females. In the present report, the results have been presented in graphs.

A STUDY OF COPPER IN HUMAN ENAMEL

Finn Brudevold and Ludville T. Steadman, p. 209.

The concentrations of copper were determined spectrographically in successive layers of enamel which were ground and pooled from unerupted teeth and erupted teeth representing different age groups. The amount of copper was measured also in successive acid etchings of intact enamel from individual teeth. Simultaneous phosphorus determinations permitted comparison of copper to phosphorus ratios. Copper was found to have a random distribution throughout the enamel and to average 20 ppm. There was no difference in the copper content of the enamel from unerupted and erupted teeth. There was a wide variation in the copper content of the external enamel of individual teeth. No correlation was found between the copper content and the occurrence of hypoplasia, pigmentation, caries or acid solubility.

THE LOCATION OF RADIOCALCIUM IN THE MANDIBULAR INCISOR AND ADJACENT STRUCTURES OF THE RAT

Howard M. Myers, p. 217.

An intravenous injection of 5 microcuries of radiocalcium was given to female rats. The animals were sacrificed at intervals of from one to eight days. One hour after administration of the radioisotope, radiocalcium was found in the labial portion of incisor enamel separate from the dentinal radiocalcium. Somewhere between two and eight days the dentinal and enamel radiocalcium unite as shown by radioautographs. The evidence supports the concept of enamel maturation via the enamel organ.

THE COMPARATIVE TURNOVER RATES OF P^{32} IN NORMAL AND DEFICIENT RATS' TEETH AND BONES DURING RECOVERY FROM PHOSPHORUS DEFICIENCY

Howard M. Myers, p. 225.

THE CORRELATION OF GAIN IN BODY WEIGHT AND MINERAL ASH CONTENT OF TEETH AND BONES OF RATS RECOVERING FROM PHOSPHORUS DEFICIENCY

Howard M. Myers, p. 230.

Ninety female Long-Evans rats were placed on an adequate stock diet. Three to four days later the animals were divided into three experimental groups. The first group received a purified low-phosphorus ration with a calcium:phosphorus ratio of 4. The second group received a purified normal control diet with a calcium:phosphorus ratio of 1 and was pair-fed with the animals fed the phosphorus deficient diet. The remainder of the animals were fed the control diet. All animals were weighed every two days.

At 72 days of age the animals on the phosphorus deficient diet were given the control ration. The animals were sacrificed during the next 14 days, two animals from each group being decapitated at each interval. The

femur, incisor and molar specimens were studied.

The following conclusions were drawn. During recovery from phosphorus deficiency the femurs are restored faster than is body weight. Both molars and incisors are mineralized at a slower rate than the rate at which body weight returns to normal. An explanation of this phenomenon is offered.

STUDIES ON THE EFFECT OF SELECTIVE DESALIVATION ON THE DENTAL CARIES INCIDENCE OF ALBINO RATS

Abraham Schwartz and James H. Shaw, p. 239.

Surgical removal of the major salivary glands of white rats fed a cariogenic diet caused production of severe caries in 8 to 12 weeks. To determine whether relative degrees of caries could be obtained by extirpation of single pairs of glands, or of combinations of pairs of glands, two experiments were designed in which such operations were performed on 200 white rats.

Removal of the parotids or the submaxillary glands resulted in caries scores which were significantly greater than those of the unoperated control animals, but which were significantly less than those of the completely desalivated animals. Removal of the extraorbital lacrimal or the major sublingual glands resulted in no significant increase or barely significant increases in caries as compared to the caries in control rats.

Elimination of the major salivary glands on one side produced caries scores on that side significantly greater than scores on the intact side. The total caries score for rats from which the major salivary glands on one side were removed was significantly less than the score in completely desalivated rats. In groups of rats where combinations of two pairs of salivary glands were removed, the resulting caries scores were not uniformly greater than scores when only one of the two pairs was removed. This result might partially be explained by the significant increases in both the absolute gland weights and the ratio of the weight of the remaining glands to the body weight as compared to the weights of the control animals.

THE AMINO ACIDS OF HUMAN SALIVA: A CHROMATOGRAPHIC INVESTIGATION

M. G. Woldring, p. 248.

A quantitative determination of free amino acids in human saliva is carried out chromatographically by means of Dowex-50 ion exchanger columns. The saliva, collected by chewing paraffin, is deproteinized by ultrafiltration through cellophane and, where the amount of free amino acids is extremely small, evaporated *in vacuo* to dryness. The residue is dissolved and prepared for placement on the column. The eluted fractions are determined by the photometric ninhydrin method. The salivary amino acid contents determined in the present study are usually lower than the concentrations of these components found chromatographically in blood plasma. The presence of at least 18 amino acids in saliva has been demonstrated.

METHOD FOR THE COLLECTION OF SEPARATE SUBMAXILLARY AND SUBLINGUAL SALIVAS IN MAN

Leon H. Schneyer, p. 257.

A method is described for the routine collection of separate submaxillary and sublingual gland secretions in man. This method is based on a modification of a device used by Pickerill (1919) for the collection of mixed submaxillary and sublingual saliva and involves the construction of a separate acrylic appliance for each saliva donor.

This appliance fits in the floor of the mouth and contains three chambers, each open inferiorly to its full extent. The medial chamber overlies the submaxillary duct orifices; the lateral chambers cover the plica sublingualis on each side. Plastic tubing leads from each chamber to the exterior and serves to conduct the secretions to the collection tubes. Each chamber is separated from the other by a rim of acrylic resin which contacts the tissue and creates an effective seal.

WEATHER CONDITIONS AFFECTING PATIENTS' REACTIONS TO LOCAL ANESTHETICS. II. A REPORT OF 2,708 CONSECUTIVE CASES

Allison G. James, p. 262.

Among 2,708 consecutive local anesthetics administered for purposes of cavity preparation in vital teeth and with a patient age range from five and a half to 85 years, there were 140 anesthetics incomplete or of very short duration (5.2 per cent). Minor toxic manifestations appeared in 32 cases (1.1 per cent) but never simultaneously with incomplete anesthesias.

A report made after the first two years of this five year study indicated that the incomplete anesthesias occurred in connection with

environmental temperature peaks and the toxic manifestations with intervening polar infalls. All weather data were included on the monthly graphs, but correlation is found only with the temperature changes in this area of Southern California.

It is not the degree of temperature but the change that appears to be the relevant factor. The seasonal concept previously suggested proved untenable in this five year study. The belief that unusual experiences with local anesthetics are directly related to environmental temperature change appears to have become increasingly sound.

WEATHER CONDITIONS AFFECTING PATIENTS' REACTIONS TO LOCAL ANESTHETICS. III. A REPORT OF 1,103 CONSECUTIVE CASES, USING LIDOCAINE

Allison G. James, p. 268.

Among 1,103 consecutive local anesthetics administered for purposes of cavity preparation in vital teeth and with a patient age range from 9 to 75 years, there were 41 (3.7 per cent) anesthesias incomplete or of very short duration. Minor toxic manifestations appeared in only two cases (0.18 per cent) but never simultaneously with incomplete anesthesias. The incomplete anesthesias occurred in connection with temperature peaks and usually when preceded by a series of peaks with intervening polar infalls. Temperature change—not degree of heat or cold—has been found to be the pertinent demonstrable factor in this area of Southern California.

Individuals have different capacities for accommodation to environmental change. It would appear from these studies that the repeated impacts of environmental temperature change have exceeded the capacity of the individual to accommodate when an unusual anesthetic reaction is experienced. It appears that the patients for whom anesthesia probably will be incomplete give some evidence of inadequate circulatory mechanisms with a tendency toward water retention in the tissues. The condition of the patient which causes inability to meet environmental change requires further investigation.

SOME FACTORS AFFECTING THE DIMENSIONAL STABILITY OF THE AG-SN-(CU-ZN) AMALGAMS

J. A. Mitchell, I. C. Schoonover, George Dickson and H. C. Vacher, p. 273.

An investigation of the roentgenogram diffraction characteristics and of the dimensional changes of silver-tin-(copper-zinc) amalgams during and after their hardening period indicated that uncombined mercury was present in the amalgams after the initial solidification and that this uncombined mercury disappeared during the period when greatest dimensional changes occurred. On the basis of the data obtained, it is postulated that the expansion during the hardening of amalgam results from diffusion of uncombined mercury throughout the material; the subsequent shrinkage results from combination of this mercury with existing phases or with residual alloy.

STUDY ON THE PRESSORECEPTIVE SENSIBILITY OF THE TOOTH

W. R. Loewenstein and R. Rathkamp, p. 287.

The tooth is an organ with mixed sensorial functions. The mechanoreceptive sensibility of the tooth was studied. A new spring esthesiometer for excitability measurements of pressoreceptors is described. The average threshold value to pressure of 2.5 Gm. places the human tooth among the structures of high sensibility. The thresholds increase from anterior to posterior teeth in a parallel fashion in maxilla and mandible. Denervation of the pulp causes a significant rise in threshold. Evidence is presented for the existence of intradental as well as periodontal mechanoreceptors. The functional significance of these receptors is discussed.

IN VITRO EXPERIMENTS ON THE BACTERICIDAL EFFECT OF ZINC OXIDE EUGENOL CEMENT ON BACTERIA-CONTAINING DENTIN

H. J. Turkheim, p. 295.

Sterile slices of decalcified dentin 1 mm. thick were inoculated with four pure test strains: *Staphylococcus pyogenes aureus, Lactobacillus acidophilus odontolyticus, Escherichia coli* and *Monilia albicans.* The slices were then exposed to a zinc oxide eugenol cement *in vitro* for 1, 3, 6, 24, 32 and 48 hours. Gram negative *E. coli* proved to be the most sensitive organism throughout the entire series. The cement exerted a bacteriostatic and bactericidal effect on the other three strains. After close contact with the cement for 24 and 48 hours, all inoculated slices were sterile. Under similar conditions, natural decay obtained from extracted carious teeth was resistant, and in no single instance was the decayed dentin sterilized.

Deaths

Good, Robert M., New York; Chicago College of Dental Surgery, Loyola University, 1892; died May 8; aged 90.

Goomrigian, Karnig, Paterson, N. J.; School of Dentistry, University of Pennsylvania, 1927; died May 24; aged 51.

Gorham, Perry W., Los Angeles; College of Dentistry, University of California, 1908; died April 4; aged 70.

Graves, Idella E., Cleveland; Dental School, Northwestern University, 1908; died March 6; aged 84.

Greaves, Samuel P., Flushing, N. Y.; School of Dentistry, Royal College of Dental Surgeons, Toronto, 1922; died April 14; aged 55.

Gregg, Vern M., Eaton, Ohio; College of Dentistry, University of Iowa, 1896; died October 4, 1954; aged 90.

Griffin, James M., Omaha; College of Dentistry, Creighton University, 1927; died March 27; aged 55.

Hanke, Roland H., Plymouth, Wis.; Dental School, Marquette University, 1907; died in February; aged 70.

Harada, Kazuto, Seattle; died April 23; aged 50.

Harrison, Julius C., Frisco City, Ala.; Atlanta Dental College, 1915; died March 15; aged 68.

Healey, James F., Indianapolis; School of Dentistry, Indiana University, 1932; died April 7; aged 47.

Herman, Samuel, Butte, Mont.; School of Dentistry, University of Denver, 1913; died March 19; aged 67.

Herrell, Dana D., Excelsior Springs, Mo.; Kansas City Dental College, 1912; died April 14; aged 67.

Hestle, James J., Monroeville, Ala.; Atlanta Dental College, 1908; died January 11; aged 73.

Hicks, Elgin D., Detroit; School of Dentistry, Royal College of Dental Surgery, Toronto, 1920; died March 5; aged 58.

Hopkins, Elizabeth, Portland, Ore.; died April 24; aged 80.

Hummell, Robert G., Lancaster, N. Y.; School of Dentistry, University of Buffalo, 1908; died January 9; aged 68.

Hurd, William L., Eaton Rapids, Mich.; College of Dental Surgery, University of Michigan, 1900; died March 3; aged 83.

Hurdle, John Y., Maywood, Ill.; Chicago College of Dental Surgery, Loyola University, 1918; died April 20; aged 61.

Imbody, Elmer W., Marion, Ohio; Indiana Dental College, 1913; died March 3; aged 64.

Irby, Henry C., Blackstone, Va.; School of Dentistry, Medical College of Virginia, 1917; died April 15; aged 61.

Kanouse, Dodd H., Spring Green, Wis.; Chicago College of Dental Surgery, Loyola University, 1911; died March 19; aged 70.

Kavaller, Joseph, Laurelton, N. Y.; died May 13; aged 58.

Keeler, Reinard S., Havertown, Pa.; School of Dentistry, Temple University, 1910; died April 18.

Kemper, Claude M., Tippecanoe, Ohio; Ohio College of Dental Surgery, University of Cincinnati, 1916; died April 21; aged 60.

Kesler, Warren J., Goshen, Ind.; Dental School, Northwestern University, 1903; died March 21; aged 75.

Ketcham, Stuart T., Stamford, Conn.; School of Dentistry, University of Pennsylvania, 1910; died May 5; aged 67.

Kiddoo, Clyde H., Coffeyville, Kan.; Kansas City-Western Dental College, 1927; died April 5; aged 51.

Kirby, George A., Port Richmond, N. Y.; died May 5; aged 60.

Klassen, George S., Hillsboro, Kan.; Kansas City-Western Dental College, 1924; died April 11; aged 62.

Kuivinen, Elmer J., Bessemer, Mich.; College of Dental Surgery, University of Michigan, 1921; died March 20; aged 57.

Laffoon, Gilmer M., Kansas City, Mo.; Kansas City Dental College, 1912; died April 8; aged 63.

Larkin, Richard B., Haverhill, Mass.; Dental School, Tufts College, 1912; died February 14; aged 68.

Lee, Arthur B., Tacoma, Wash.; Dental School, Northwestern University, 1907; died May 4; aged 70.

Le Fevre, Charles H., Whitehall, Mich.; Chicago College of Dental Surgery, Loyola University, 1907; died March 5; aged 77.

Lester, Bliss Allen, Norfolk, Va.; Baltimore College of Dental Surgery, University of Maryland, 1905; died March 21; aged 78.

Lindholm, Eric, Ocean Springs, Miss.; Chicago College of Dental Surgery, Loyola University, 1899; died February 10; aged 80.

Locker, Sol J., New York; died March 8; aged 58.

Macom, John M., New Brunswick, N. J.; School of Dentistry, University of Pennsylvania, 1923; died March 20; aged 55.

Mansbach, Isaac L., Baltimore; Baltimore College of Dental Surgery, 1903; died November 2, 1954; aged 71.

Marco, Baruch B., New York; New York College of Dentistry, 1897; died June 4; aged 81.

Maupin, Ira T. Jr., Litchfield, Ill.; School of Dentistry, Washington University, St. Louis, 1935; died March 27; aged 48.

May, Shirley L., Flandreau, S. D.; College of Dentistry, University of Iowa, 1915; died April 23; aged 67.

McCabe, James G., Somerville, Mass.; Dental School, Tufts College, 1933; died October 3, 1954; aged 53.

McCrea, John F., Los Angeles; Chicago College of Dental Surgery, Loyola University, 1892; died May 29; aged 87.

McDonagh, John F., Parma, Ohio; College of Dentistry, Western Reserve University, 1904; died March 22; aged 77.

McDonald, George H., Hawley, Minn.; Dental School, Marquette University, 1912; died April 27; aged 73.

McLaughlin, William C., Danielson, Conn.; Baltimore College of Dental Surgery, 1905; died January 10; aged 71.

McLaughlin, William J., Bridgeport, Conn.; School of Dentistry, University of Pennsylvania, 1902; died May 25; aged 74.

McNally, James F., Woonsocket, R. I.; Philadelphia Dental College, 1900; died April 28; aged 85.

Meisterhans, Edwin E., Hamilton, Ohio; Cincinnati College of Dental Surgery, 1913; died April 8; aged 70.

Merrill, Benjamin P., Trenton, N. J.; School of Dentistry, University of Pennsylvania, 1908; died April 29; aged 74.

Miller, Charles E., Carbondale, Ill.; School of Dentistry, St. Louis University, 1929; died May 21; aged 55.

Millstein, Morris R., New York; New York College of Dentistry, 1918; died April 5; aged 63.

Mishnun, Harry, New York; College of Dental and Oral Surgery, New York, 1905; died May 3; aged 77.

Morgan, Charles M., Texhoma, Okla.; School of Dentistry, St. Louis University, 1928; died April 23; aged 64.

Newcomb, Harvey H., Rochester, N. Y.; School of Dentistry, University of Buffalo, 1903; died March 4; aged 80.

Niemi, Walter A., Fitchburg, Mass.; Chicago College of Dental Surgery, Loyola University, 1918; died March 18; aged 63.

Norman, Eugene F., St. Petersburg, Fla.; Indiana Dental College, 1917; died March 11; aged 61.

O'Hara, Charles W., Pittsburgh; Pittsburgh Dental College, Western University of Pennsylvania, 1904; died April 11; aged 72.

Osborne, Frank S., Columbia, Tenn.; School of Dentistry, Vanderbilt University, 1905; died April 21; aged 72.

Padula, Joseph D., Hartford, Conn.; Dental School, Northwestern University, 1945; died January 30; aged 34.

Parmelee, John H., Livonia, N. Y.; School of Dentistry, University of Buffalo, 1905; died February 3; aged 73.

Pierce, Lewis J., Boston; died February 7.

Piper, James R., Dover, Mass.; died November 21; aged 91.

Pollock, Lelah K., Forest Grove, Ore.; School of Dentistry, North Pacific College of Oregon, Portland, 1935; died April 18; aged 65.

Prentice, Harry W., Cranford, N. J.; died May 5.

Raeburn, Bruce J., St. Paul; College of Dentistry, University of Minnesota, 1926; died March 11; aged 53.

Reblitz, J. W., Fond du Lac, Wis.; died in February; aged 74.

Redens, Boone, New Albany, Ind.; died February 8; aged 72.

Rittenhouse, Ona, Paterson, N. J.; Philadelphia Dental College, 1907; died January 4; aged 77.

Ritter, Roy E., Anderson, Ind.; Indiana Dental College, 1911; died January 7; aged 65.

Rivers, Herbert J., Miami, Fla.; died March 7; aged 52.

Roach, Vernon A., Wakefield, Mass.; Baltimore College of Dental Surgery, 1898; died May 6; aged 84.

Rohner, Franklin E., Fortuna, Calif.; College of Dentistry, University of California, 1904; died May 7; aged 76.

Rohrer, Jacob W., Granville, Ohio; Ohio College of Dental Surgery, University of Cincinnati, 1898; died April 25; aged 78.

Rosenberg, Samuel H., Chicago; Dental School, Northwestern University, 1914; died May 15; aged 70.

Ruff, Guy M., Los Angeles; died May 31; aged 80.

Scanlon, Edward F., Indianapolis; School of Dentistry, Indiana University, 1938; died April 10; aged 52.

Schneider, Wilbert J., Bethesda, Md.; Ohio College of Dental Surgery, University of Maryland, 1923; died April 13; aged 54.

Schultze, Louis, Chicago; Dental School, Northwestern University, 1908; died June 9; aged 68.

Shaw, Harry V., Prairie View, Ill.; College of Dentistry, University of Illinois, 1912; died December 26; aged 78.

Sheehan, Albert T., Bronxville, N. Y.; died December 27.

Shipman, Leo R., Fowler, Ind.; School of Dentistry, Indiana University, 1927; died March 30; aged 50.

Siverling, George E., Chicago; Dental School, Northwestern University, 1905; died May 17; aged 78.

Small, Percy L., New York; Baltimore College of Dental Surgery, 1909; died April 22; aged 66.

Smith, John F., Erie, Pa.; College of Dental Surgery, Northwestern University, 1898; died April 6; aged 86.

Smith, Robert C., Oceanside, Calif.; College of Dentistry, University of Southern California, 1939; died April 29; aged 47.

Spring, John F., Pontiac, Mich.; College of Dental Surgery, University of Michigan, 1893; died March 11; aged 90.

Squier, Leslie E., Seattle; School of Dentistry, University of Pennsylvania, 1903; died April 9; aged 77.

Steinfeld, Edward H., New York; New York College of Dentistry, 1914; died April 23; aged 61.

Stewart, Kenneth L., Indianapolis; School of Dentistry, Indiana University, 1925; died January 14; aged 52.

Stinson, William P., Blossburg, Ala.; Birmingham Dental College, 1894; died May 6; aged 88.

Swaby, E. H., New York; died April 15; aged 70.

Swisher, William A., Lyons, Kan.; Kansas City Dental College, 1899; died April 9; aged 79.

Taft, Raymond B., Cattaraugus, N. Y.; School of Dentistry, University of Buffalo, 1903; died January 19; aged 74.

Tanner, Morton M., Pittsburgh; School of Dentistry, University of Pittsburgh, 1945; died July 2; aged 35.

Thielen, Benjamin F., Paris, Texas; School of Dentistry, Vanderbilt University, 1900; died February 12; aged 77.

Thompson, William C., Portland, Ore.; died May 4.

Throckmorton, William L., Verona, Pa.; Pittsburgh Dental College, Western University of Pennsylvania, 1899; died June 18; aged 80.

Titzel, Josiah R., Greenville, Pa.; Pittsburgh Dental College, Western University of Pennsylvania, 1899; died April 18; aged 82.

Topping, Howard E., Staunton, Va.; Baltimore College of Dental Surgery, University of Maryland, 1913; died January 24; aged 63.

Townsend, Frederick A. S., Detroit; died February 11; aged 71.

Trompen, Cornelius N., Denver; Chicago College of Dental Surgery, Loyola University, 1890; died May 15; aged 87.

Underhill, Ernest C., Colton, Calif.; College of Dentistry, University of Southern California, 1915; died September 7, 1954; aged 77.

Vail, Frank, Detroit; Department of Dental Surgery, Detroit College of Medicine, 1897; died March 2; aged 85.

Vanderstolp, Anthony, Grand Rapids, Mich.; died May 4.

Vladimir, Morris M., Brooklyn; School of Dental and Oral Surgery, Columbia University, 1924; died April 27; aged 55.

Vold, Anton, Whitehall, Wis.; Chicago College of Dental Surgery, Loyola University, 1902; died April 22; aged 76.

Wahrman, Stella E., New York; died April 7; aged 62.

Warren, Clarence S., Milford, Ohio; Ohio College of Dental Surgery, University of Cincinnati, 1908; died June 7; aged 75.

Warren, Thad H., Youngstown, Ohio; College of Dentistry, Western Reserve University, 1914; died April 22; aged 68.

Watson, Walter S., Brooklyn; New York College of Dentistry, 1902; died June 6; aged 75.

Wellge, William E., Milwaukee; Dental School, Marquette University, 1903; died in March; aged 76.

Wheeler, George G., Miami, Fla.; Baltimore College of Dental Surgery, University of Maryland, 1904; died April 12; aged 73.

Whetstone, Sylvester S., Cincinnati; College of Dentistry, Ohio Medical University, 1903; died April 25; aged 76.

Whitchurch, Ernest V. L., Boston; died December 28; aged 81.

White, George R., Parsons, Kan.; Kansas City Dental College, 1900; died April 22; aged 85.

Whitney, Frank T., Saginaw, Mich.; College of Dental Surgery, University of Michigan, 1926; died April 1; aged 55.

Wiesner, Ferdinand B., St. Louis; Western Dental College, Kansas City, 1898; died February 25; aged 79.

Willcox, Harry P., New York; died January 16; aged 90.

Williams, Lester C., Clinton, Mo.; Kansas City-Western Dental College, 1937; died April 19; aged 53.

Wilson, Joseph M., Centerburg, Ohio; died March 18; aged 80.

Wood, Henry C., Detroit; College of Dental Surgery, University of Michigan, 1901; died March 24; aged 79.

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All expressions of opinion and all statements of supposed fact are published on the authority of the writer over whose signature they appear and are not to be regarded as expressing the views of the American Dental Association, unless such statements or opinions have been adopted by the Association. Articles are accepted with the understanding that they have not been published previously and that they are submitted solely to The Journal. The Journal of the American Dental Association is indexed in the Index to Dental Literature, in the Current List of Medical Literature and, in part, in the Quarterly Cumulative Index Medicus, Biological Abstracts and Chemical Abstracts.

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Announcements

MEETINGS OF THE AMERICAN DENTAL ASSOCIATION

Ninety-Sixth Annual Session	Oct. 17-20, 1955	San Francisco
Ninety-Seventh Annual Session	Oct. 1-4, 1956	Atlantic City, N. J.
Ninety-Eighth Annual Session	Nov. 4-7, 1957	Miami, Fla.
Ninety-Ninth Annual Session	Nov. 10-13, 1958	Dallas, Texas
One-Hundredth Annual Session	Sept. 21-24, 1959	New York

MEETINGS OF CONSTITUENT SOCIETIES

State	Date	Place	Secretary	Address
Alabama	Apr. 14-16, 1956	Biloxi, Miss.	F. A. Finney, Jr.	1045 Forrest Ave., Gadsden
Alaska			J. L. Irby	1010 Noble St., Fairbanks
Arizona	Apr. 11-14, 1956	Tucson	R. W. Christensen	17 E. Weldon Ave., Phoenix
Arkansas	Apr. 8-11, 1956	Little Rock	D. M. Hamm	Box 89, Clarksville
California	Apr. 23-25, 1956	San Francisco	W. J. Healy	450 Sutter St., San Francisco
S. California	Apr. 30-May 2, 1956	Los Angeles	J. P. Bowers	903 Crenshaw Blvd., Los Angeles
Colorado	Oct. 2-5	Colorado Springs	W. R. Humphrey	724 Republic Bldg., Denver
Connecticut	May 2-4, 1956	Hartford	E. S. Arnold	37 Linnard Rd., W. Hartford
Delaware	Jan. 9, 1956	Wilmington	R. V. Reed, Jr.	Medical Arts Bldg., Wilmington
District of Columbia	Mar. 11-14, 1956	Washington	J. F. Keaveny	1029 Vermont Ave., N.W., Washington
Florida	May 28-30, 1956	Miami Beach	W. A. Buhner	167 Broadway, Daytona Beach
Georgia	Oct. 2-5	Atlanta	J. W. Yarbrough	Bibb Bldg., Macon
Hawaii	Sept. 10-15, 1956	Maui Island	J. H. Dawe	810 N. Vineyard St., Honolulu
Idaho	Sept. 27-29, 1956	Sun Valley	D. E. Sonius	125 Fourth Ave., N., Twin Falls
Illinois	May 14-17, 1956	Springfield	P. W. Clopper	623 Jefferson Bldg., Peoria
Indiana	May 21-23, 1956	Indianapolis	D. C. Barnhill	409 Bankers Trust Bldg., Indianapolis
Iowa	May 6-9, 1956	Des Moines	H. I. Wilson	639 Insurance Exchange Bldg., Des Moines
Kansas	May 14-17, 1956	Topeka	F. A. Richmond	861 Brotherhood Bldg., Kansas City
Kentucky	Apr. 8-11, 1956	Louisville	A. B. Coxwell, Jr.	1976 Douglass Blvd., Louisville
Louisiana	Apr. 11-14, 1956	Alexandria	J. S. Bernhard	2515 Line Ave., Shreveport
Maine	June 21-23, 1956	Rockland	S. M. Gower	Box 27, Skowhegan
Maryland	May 7-9, 1956		C. L. Inman, Jr.	Medical Arts Bldg., Baltimore
Massachusetts	May 6-9, 1956	Boston	H. E. Tingley	12 Bay State Rd., Boston
Michigan	Apr. 16-19, 1956	Detroit	F. Wertheimer	Michigan Dept. of Health, Lansing
Minnesota	Apr. 23-25, 1956	St. Paul	C. V. E. Cassel	225 Hamm Bldg., St. Paul
Mississippi	June 10-13, 1956	Biloxi	B. A. Cohen	306 Plaza Bldg., Jackson
Missouri	May 6-9, 1956	Jefferson City	E. D. Suggett	201 Merchants Bank Bldg., Jefferson City
Montana	May 3-6, 1956	Helena	E. G. Vedova	Box 311, Roundup
Nebraska	Apr. 30-May 3, 1956	Omaha	F. A. Pierson	1112 Federal Securities Bldg., Lincoln
Nevada			O. M. Seifert	506 Humboldt St., Reno
New Hampshire			F. E. Williams	814 Elm St., Manchester
New Jersey	Apr. 23-25, 1956	Atlantic City	J. G. Carr	407 Cooper St., Camden
New Mexico	May 20-23, 1956	Santa Fe	J. S. Eilar	Medical Arts Square, N.E., Albuquerque
New York	May 14-16, 1956	Syracuse	C. A. Wilkie	1 Hanson Place, Brooklyn
North Carolina	May 13-16, 1956	Pinehurst	R. D. Coffey	Box 270, Morganton
North Dakota	May 6-9, 1956	Minot	J. H. Pfister	419½ Dakota Ave., Wahpeton
Ohio	Nov. 13-16	Cleveland	E. G. Jones	185 E. State St., Columbus
Oklahoma	Apr. 22-25, 1956	Oklahoma City	S. A. Russman	809 Medical Arts Bldg., Oklahoma City

State	Date	Place	Secretary	Address
Oregon	Mar. 5-7, 1956	Portland	T. D. Holder	308 Selling Bldg., Portland
Panama Canal Zone			J. J. Dunn	5700 Dispensary, Albrook Air Force Base
Pennsylvania	Apr. 19-21, 1956	Harrisburg	M. D. Zimmerman	217 State St., Harrisburg
Puerto Rico			M. A. Rosso	409 Parque St., Santurce, San Juan
Rhode Island	Jan. 17, 18, 1956	Providence	W. D. MacIntosh	506 Industrial Bank Bldg., Providence
South Carolina			J. R. Owings	7 Medical Court, Greenville
South Dakota	May 13-16, 1956	Huron	L. N. Thelen	229 S. Prairie St., Sioux Falls
Tennessee	Apr. 30-May 3, 1956	Memphis	A. M. Ballentine	Pulaski
Texas	Apr. 29-May 2, 1956	Fort Worth	W. Ogle	3707 Gaston Ave., Dallas
Utah	May 17-19, 1956	Salt Lake City	R. C. Dalgleish	124 State Capitol Bldg., Salt Lake City
Vermont	May 20-22, 1956	Manchester	E. H. Van Santvoord	128 Merchants Row, Rutland
Virginia	May 9-12, 1956	Roanoke	W. T. McAfee	705 Colonial National Bank Bldg., Roanoke
Washington	Mar. 22-24, 1956	Seattle	W. B. Martin	Medical-Dental Bldg., Seattle
West Virginia	July 22-25, 1956	White Sulphur Springs	G. N. Casto, Jr.	710½ Lee St., Charleston
Wisconsin	Apr. 9-11, 1956	Milwaukee	A. E. Kopp	Wells Bldg., Milwaukee
Wyoming	June, 1956	Cody	T. J. Drew	State Office Bldg., Cheyenne

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

State	Date	Place	Secretary	Address
Alabama			W. L. McCarty	200 Professional Center, Montgomery
Alaska			R. H. Williams	Box 2122, Juneau
Arizona			R. K. Trueblood	107 East A Ave., Glendale
Arkansas			H. O. Weatherly	205 Halter Bldg., Conway
California			T. E. Tilden	Medico-Dental Bldg., Sacramento
Colorado			J. M. Peabody	724 Republic Bldg., Denver
Connecticut			C. G. Brooks	302 State St., New London
Delaware			P. K. Musselman	143 W. Main St., Newark
District of Columbia	Jan 9-13, 1956	Washington	W. T. Birthright	Suite 718, 1835 Eye St., N.W., Washington
Florida	July 9-19, 1956*†	Jacksonville	A. W. Kellner	P. O. Box 155, Hollywood
Georgia			P. M. McNeil	307 First National Bank Bldg., Rome
Hawaii			H. L. Houvener	427 Dillingham Bldg., Honolulu
Idaho			A. G. DeWinter	Sun Bldg., Boise
Illinois			W. A. McKee	503 Wood Bldg., Benton
Indiana	Nov. 14-17*†	Indianapolis	C. A. Frech	Gary National Bank Bldg., Gary
Iowa	May 28-June 1 1956*†	Iowa City	P. A. Hahn	302 Farmers & Merchants Bank Bldg., Burlington
Kansas			G. L. Teall	Box 71, Hiawatha
Kentucky			J. J. Kelly	Franklin
Louisiana			R. C. Steib	833 Maison Blanche Bldg., New Orleans
Maine			R. A. Derbyshire	Box 387, Skowhegan
Maryland	Nov. 14-16‡		H. Levin	3429 Park Heights Ave., Baltimore
Massachusetts			T. J. Glennon	State House, Boston
Michigan	Jan. 29-Feb. 4, 1956 June 10-16, 1956	Ann Arbor	J. L. Champagne	3714 W. McNichols Rd., Detroit
Minnesota	Jan. 9-13, 1956‡ June 11-15, 1956‡		M. G. Walls	615 Montcalm Place, St. Paul
Mississippi	Jan. 5-7, 1956‡ June 19-21, 1956‡		J. C. Boswell	508 Lamar Bldg., Jackson
Missouri			R. R. Rhoades	414 Central Trust Bldg., Jefferson City
Montana			R. O. Betzner	303 Power Block, Helena

State	Date	Place	Secretary	Address
Nebraska	June 11-16, 1956	Lincoln	H. E. Weber	1210 Federal Securities Bldg., Lincoln
Nevada			R. Whitehead	Suite 6, Masonic Temple, Reno
New Hampshire			S. G. Markos	8 Renaud Ave., Dover
New Jersey			W. A. Wilson	150 E. State St., Trenton
New Mexico			J. J. Clarke, Sr.	Artesia
New York			D. W. Beier	23 S. Pearl St., Albany
North Carolina			F. O. Alford	1107 Liberty Life Bldg., Charlotte
North Dakota	July 9-13, 1956	Fargo	T. M. Flath	Williston
Ohio	Nov. 7-11*†	Columbus	H. B. Smith	322 E. State St., Columbus
Oklahoma			W. E. Cole	563 First National Bank Bldg., Oklahoma City
Oregon	Dec. 5-7*†	Portland	F. L. Utter	506 Pioneer Trust Bldg., Salem
Pennsylvania			A. M. Stinson	Dept. of Public Instruction, Box 911, Harrisburg
Puerto Rico			J. Mercado C.	Box 3717, Santurce
Rhode Island			F. M. Hackett	267 Academy Ave., Providence
South Carolina			J. L. Gunter	1226 Pickens St., Columbia
South Dakota			H. T. Aker	Canton
Tennessee			C. R. Aita	619 Bennie Dillon Bldg., Nashville
Texas			R. T. Weber	312 Capital National Bank Bldg., Austin
Utah			G. W. Vogel	422 Eccles Bldg., Ogden
Vermont			P. M. Fitch	Newport
Virginia			J. M. Hughes	715 Medical Arts Bldg., Richmond
Washington			M. L. Mower	National Bank of Commerce Bldg., Olympia
West Virginia	June 25-27, 1956*†	West Liberty	J. B. Davis	501 Goff Bldg., Clarksburg
Wisconsin			S. F. Donovan	Tumah
Wyoming			W. A. Hocker	210 O & S Bldg., Casper

Most states require applications to be in 30 days prior to examination date.
*Dental examination. †Dental hygiene examination. ‡Write to secretary of dental examining board for information on locations of examinations. §Approximate dates—verify with state dental examining board.

MEETINGS OF OTHER ORGANIZATIONS

Name	Date	Place	Secy. or Chm.	Address
American Academy of Dental Medicine	Dec. 4	New York	G. J. Witkin Secy.	45 S. Broadway, Yonkers, N. Y.
American Academy of Implant Dentures	Feb. 4, 1956	Chicago	P. S. Loechler Secy.	540 N. California, Stockton, Calif.
American Academy of Maxillofacial Prosthetics	Feb. 1-4, 1956	Chicago	A. H. Bulbulian Gen. Chm.	Mayo Clinic, Rochester, Minn.
American Academy of Pedodontics	Oct. 12-14	San Francisco	E. C. Schildwachter Secy.	6831 Seville Ave., Huntington Park, Calif.
American Academy of Periodontology	Oct. 13-15	San Francisco	E. G. Baker Pub. Chm.	3400 Webster St., Oakland, Calif.
American Association of Dental Examiners	Oct. 14, 15	San Francisco	C. A. Bumstead Secy.	924 Stuart Bldg., Lincoln, Neb.
American Association of Public Health Dentists	Oct. 16	San Francisco	R. D. Smiley Secy.	Indiana State Board of Health, Indianapolis
American Board of Dental Public Health	Oct. 13, 14	San Francisco	P. E. Blackerby, Jr. Secy.	250 Champion St., Battle Creek, Mich.
American Board of Oral Pathology	Dec. 11	Washington, D.C.	D. A. Kerr Secy.	School of Dentistry, University of Michigan, Ann Arbor, Mich.
American Board of Pedodontics	Feb. 2-4, 1956	Ann Arbor, Mich.	R. L. Ireland Secy.	College of Dentistry, University of Nebraska, Lincoln, Neb.
American College of Dentists	Oct. 16	San Francisco	O. W. Brandhorst Secy.	4221 Lindell Blvd., St. Louis
American Dental Assistants Association	Oct. 17-20	San Francisco	M. L. Martin Exec. Secy.	410 First National Bank Bldg., La Porte, Ind.
American Dental Assistants Certification Board, Inc.	Oct. 16-20	San Francisco	A. Carey Secy.	601 National Bank Bldg., Lima, Ohio

Name	Date	Place	Secy. or Chm.	Address
American Dental Hygienists' Association	Oct. 17-20	San Francisco	M. E. Swanson Exec. Secy.	1735 Eye St., N.W., Washington, D.C.
American Dental Society Of Anesthesiology	Oct. 13, 16	San Francisco	J. H. Mervis Secy.	510 Walnut St., Clairton, Pa.
American Denture Society	Oct. 14, 15	San Francisco	A. L. Roberts Secy.	Aurora Main Bldg., Aurora, Ill.
American Institute of Dental Medicine	Oct. 23-27	Palm Springs, Calif.	M. G. Lewis Exec. Secy.	2240 Channing Way, Berkeley, Calif.
American Public Health Association	Nov. 14-18	Kansas City, Mo.	R. M. Atwater Exec. Secy.	1790 Broadway, New York
American Society of Dentistry for Children	Oct. 15, 16	San Francisco	E. S. Mack	Stonestown Medical Bldg., 20th and Buckingham Way, San Francisco
American Society of Oral Surgeons	Oct. 11-14	Los Angeles	R. F. Whalen Exec. Secy.	M. C. V. Post Office, Box 876, Richmond, Va.
Asociacion Odontologica Argentina	Nov. 7-9		E. E. Muller Secy.	Junin 959, Buenos Aires, Argentina
Association of American Women Dentists	Oct. 16, 17	San Francisco	L. B. Thompson Secy.	1980 E. Center Ave., Denver
Chicago Dental Society	Feb. 5-8, 1956	Chicago	K. S. Richardson Exec. Secy.	30 N. Michigan Ave., Chicago
Council on Dental Education, Dental Aptitude Tests	Oct. 7, 8		S. Peterson Secy.	222 E. Superior St., Chicago
Denver Dental Association	Jan. 8-11, 1956	Denver	B. Kletsky Secy.	Republic Bldg., Denver
Eighth New Orleans Dental Conference	Oct. 30-Nov. 2	New Orleans	W. O. Goggin Chm.	Maison Blanche Bldg., New Orleans
Fourteenth Australian Dental Congress	Mar. 5-9, 1956	Melbourne, Australia	H. R. Cash Pres.	49 Mathoura Rd., Toorak, Australia
Fourteenth Congres Francais de Stomatologie	Oct. 3-9	Paris, France	R. Vrasse Secy. Gen.	2, Rue de Miromesnil, Paris, France
Great Lakes Society of Orthodontists	Oct. 30-Nov. 2	Columbus, Ohio	H. I. Miller Secy.	1416 Mott Foundation Bldg., Flint, Mich.
Greater New York Dental Meeting	Dec. 5-9	New York	M. Purdy Exec. Secy.	Rm. 106A, Hotel Statler, New York
Greater Philadelphia Annual Meeting	Feb. 1-3, 1956	Philadelphia	J. H. Eshleman Secy.	Suite 337, Bellevue-Stratford Hotel, Broad and Walnut Sts., Philadelphia
Greater Pittsburgh Dental Meeting	Nov. 8-10	Pittsburgh	H. D. Butts, Jr. Secy.	Suite 206, Jenkins Bldg., Pittsburgh
Journees Dentaires Internationales de Paris	Nov. 21-27	Paris, France	T. Dubois Secy. Gen.	Maison de la Chimie, 28 Bis Rue Saint-Dominique, Paris, France
Mexican Dental Association, Third Dental Congress	Oct. 23-28	Mexico City	G. Sanchez C.	Uruapan 3, Mexico, D.F.
Mid-Continent Dental Congress	Nov. 27-30	St. Louis	J. E. Brophy Exec. Secy.	8013 Maryland Ave., St. Louis
National Board of Dental Examiners	Dec. 5, 6		G. J. Casey Secy.	222 E. Superior St., Chicago
New England Dental Society	Nov. 2, 3	Boston	F. L. Finley, Jr. Secy.	43 Farmington Ave., Hartford, Conn.
Northeastern Society of Orthodontists	Oct. 24, 25	New York	W. J. Prezzano Secy.	Medical Centre, White Plains, N.Y.
Pacific Coast Society of Prosthodontists	Oct. 14, 15	San Francisco	A. W. Spaulding Secy.	4350 11th Ave., Los Angeles
Pan American Odontological Association	Dec. 7	New York	R. H. Brodsky Exec. Secy.	14 E. 81st St., New York
Pan-Pacific Dental Conference	Oct. 24, 25	Honolulu, Hawaii	F. A. Sandberg	280 Lewers Rd., Honolulu, Hawaii
Southwestern Society of Orthodontists	Oct. 16-19	Wichita, Kansas	H. S. Born Secy.	908 Johnstone, Bartlesville, Okla.

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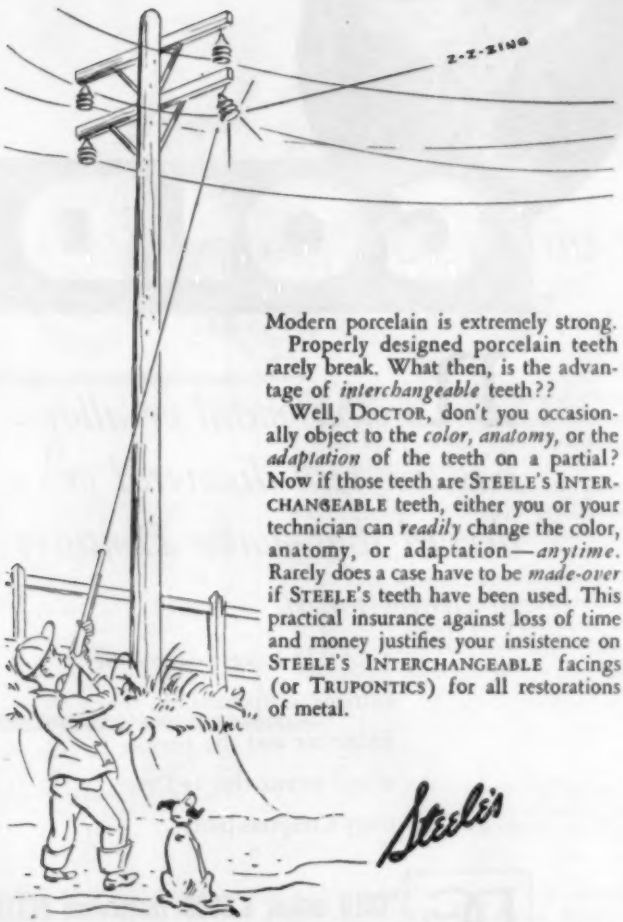

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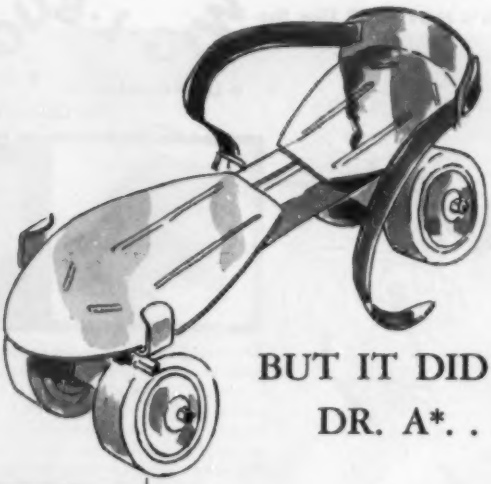

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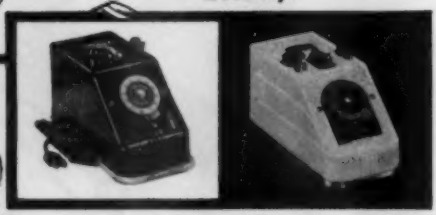

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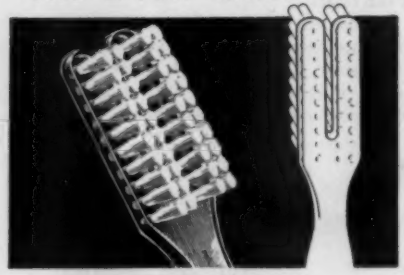

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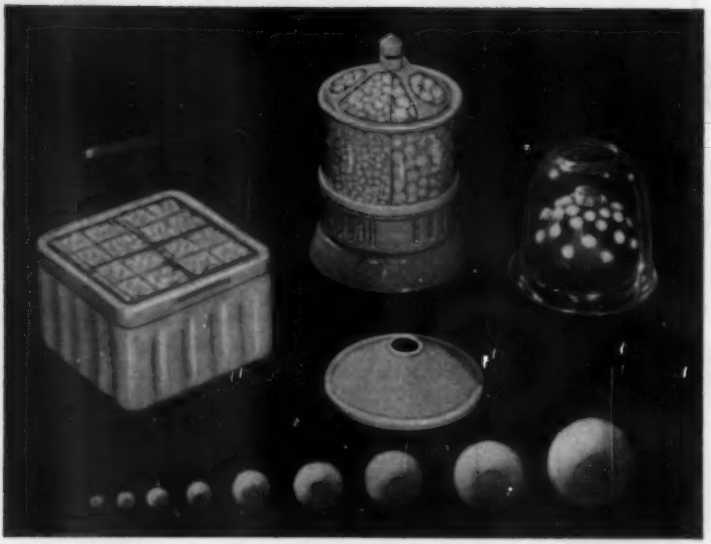

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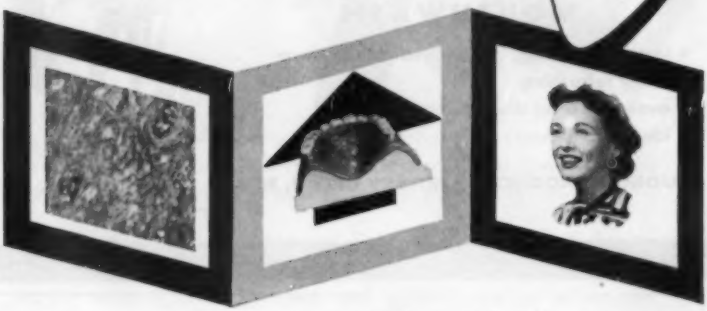

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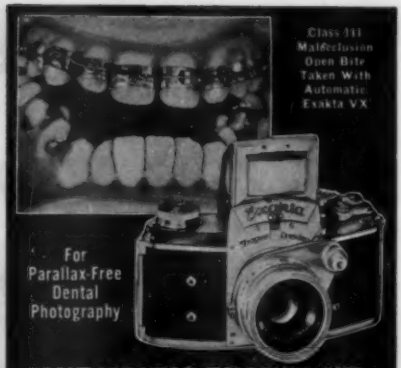

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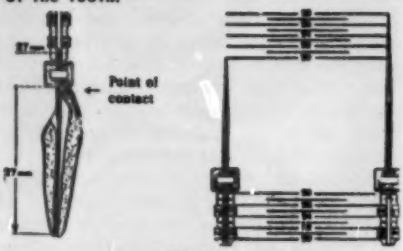

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Gurdjian, E. S., and Webster, J. E., Amer. J. of Surgery, 63:236, 1944.

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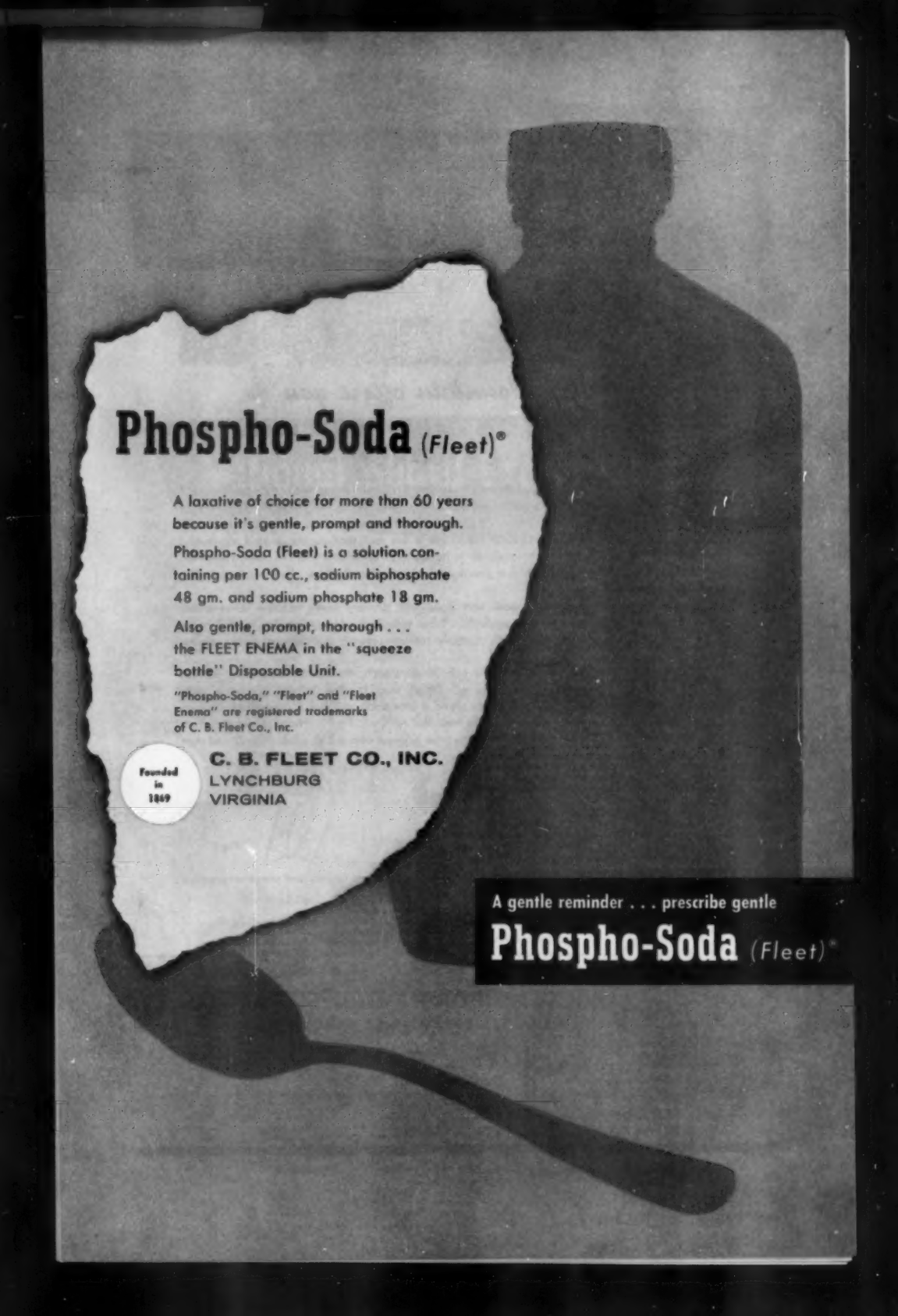
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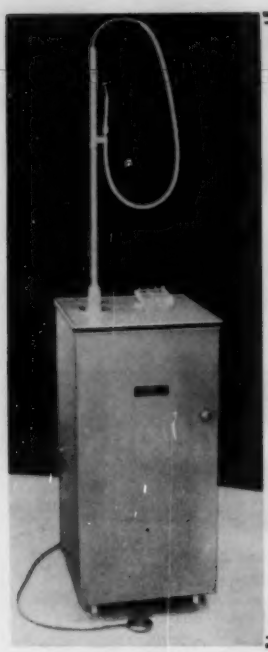

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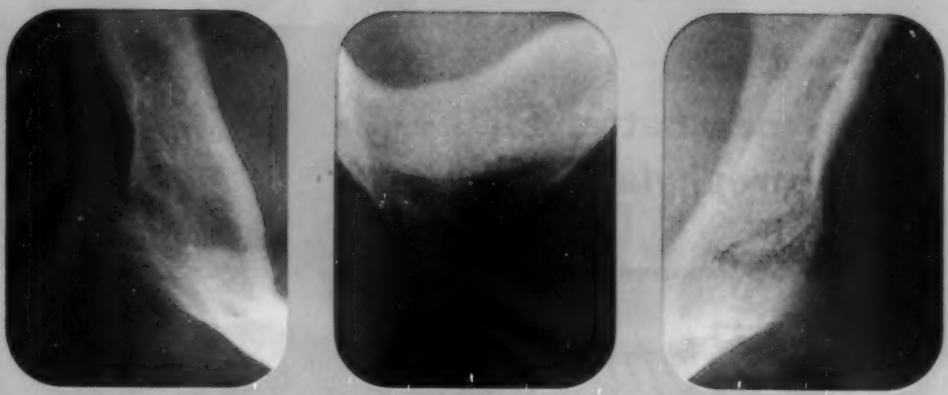

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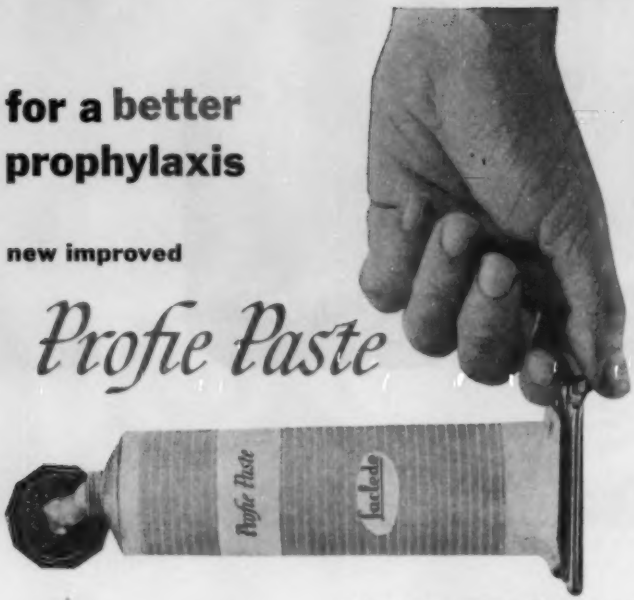

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Loyola University
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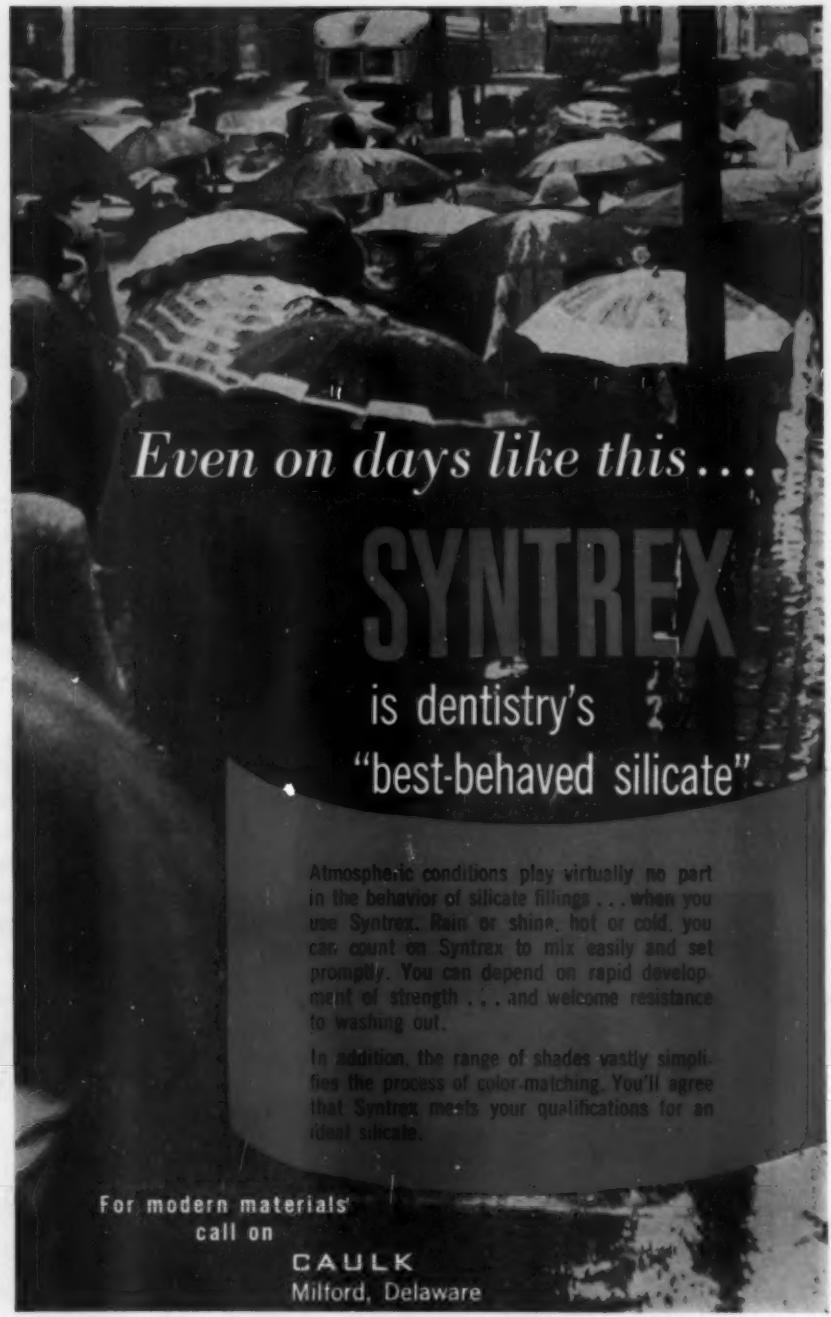
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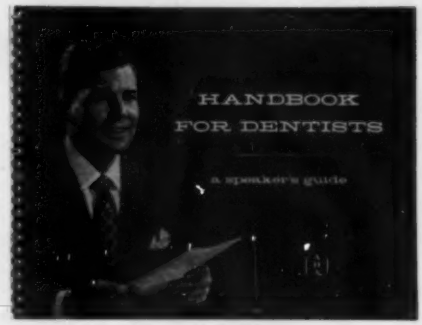

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• • •

One may reasonably speculate on why the development of dental practice as a specialization (independent of medical practice) should have occurred in different lands at such widely varying periods of history. For instance, while dental specialists are known to have practiced in Egypt as early as 3000 B.C., the first evidence in Rome of such specialization is not found until the early Christian era – in the representation of forceps and a tooth as an occupational symbol on certain tombstones.

• • •

Dental pedagogy in this century may well revere the pioneer teaching of Horace M. Hayden and John Harris. In 1818, the former gave a first series of lectures on odontology for the medical students of the University of Maryland; and the latter conducted a course in 1827 in Bainbridge, Ohio, for prospective medical and dental students. Interestingly enough, among Harris' pupils were James Taylor, who later established the Ohio College of Dental Surgery; and Chapin A. Harris, who, together with Horace Hayden, founded the Baltimore College of Dental Surgery, which opened its doors in 1840 with four professors and five students.

• • •

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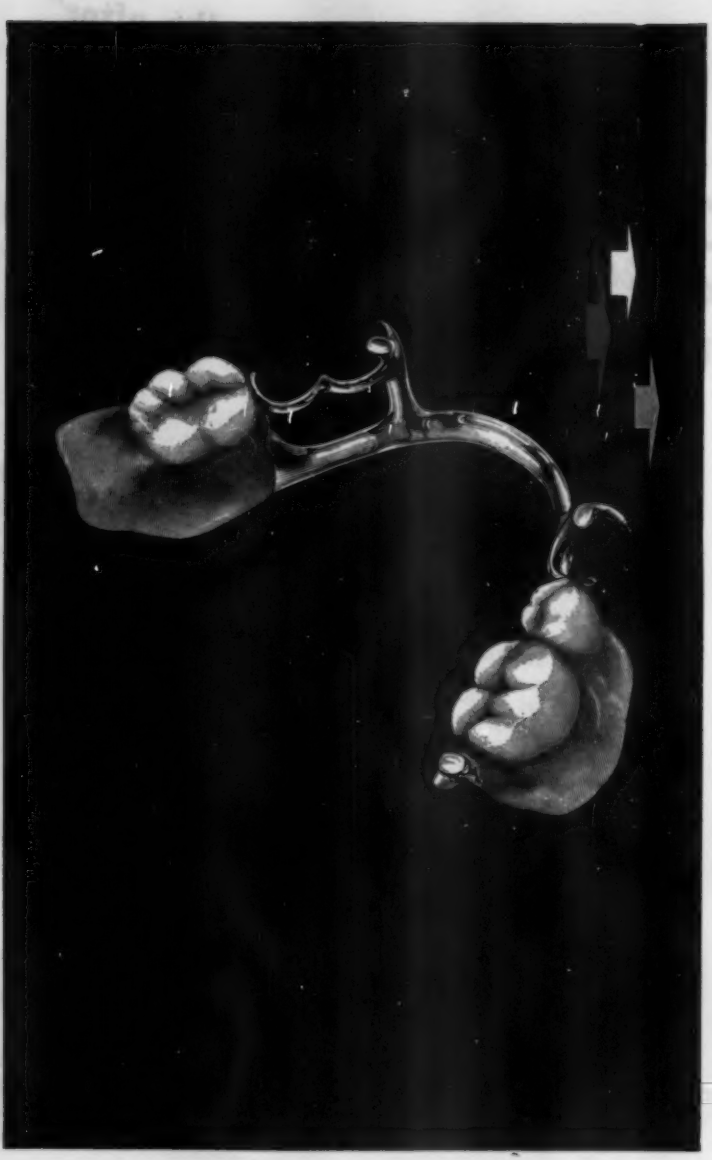

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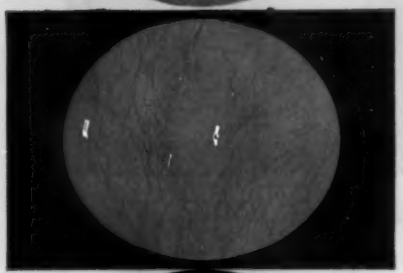

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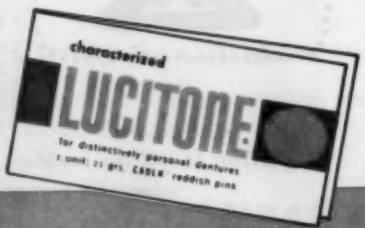

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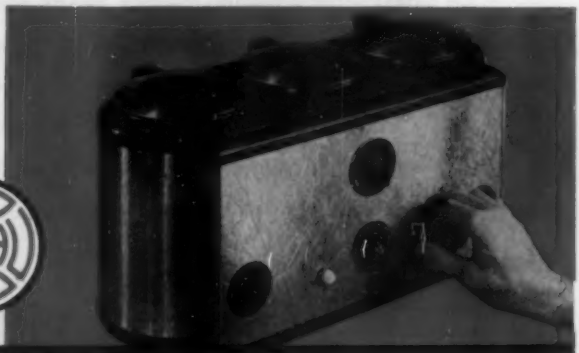

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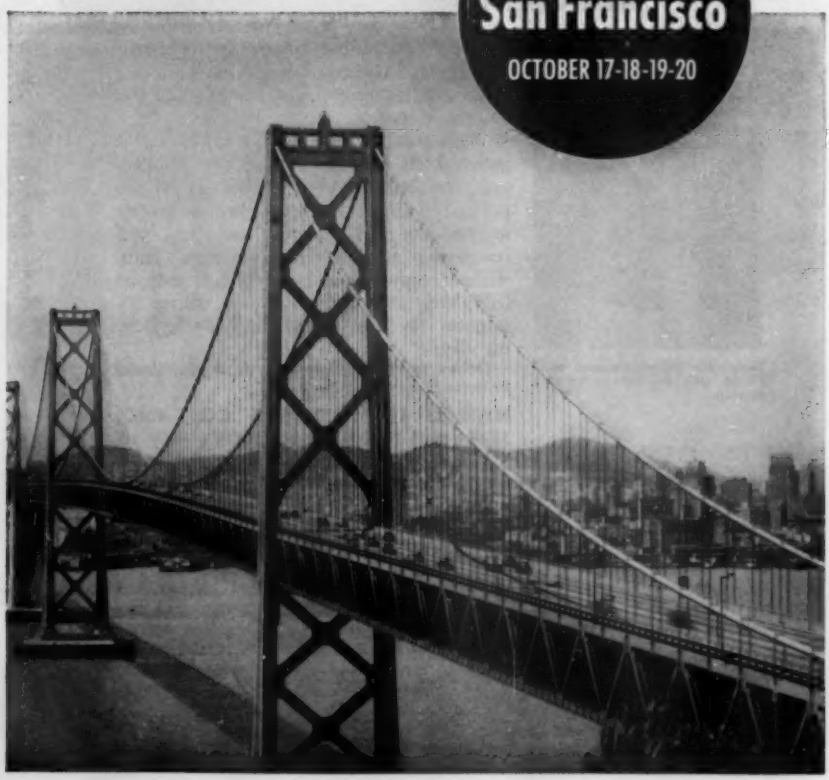

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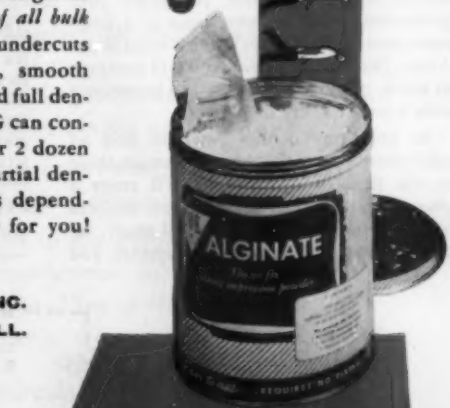

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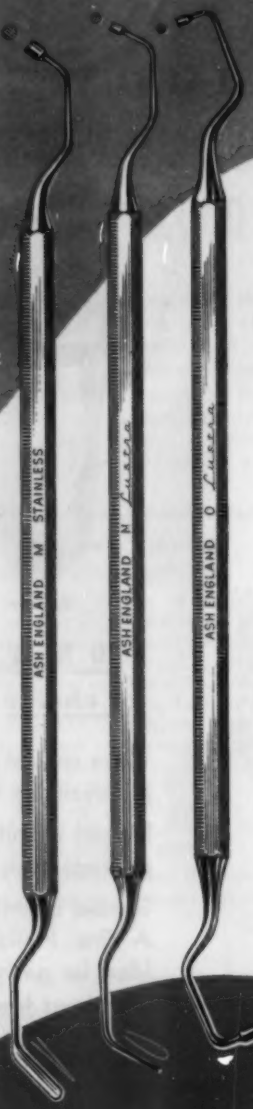

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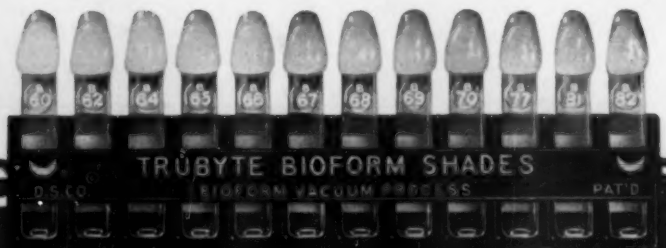

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